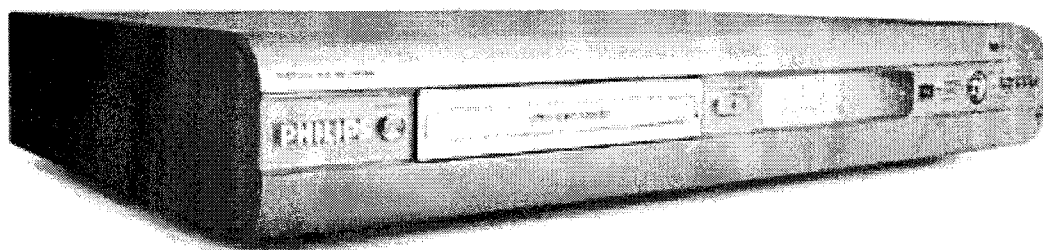


DVD-Video Recorder**DVDR610, DVDR615 & DVDR616**

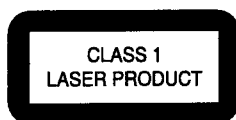
DVDR610/00/02/05/19/33, DVDR615/00/02/05/19/33

DVDR616/00/02/05

Service
Service
Service



Service Manual



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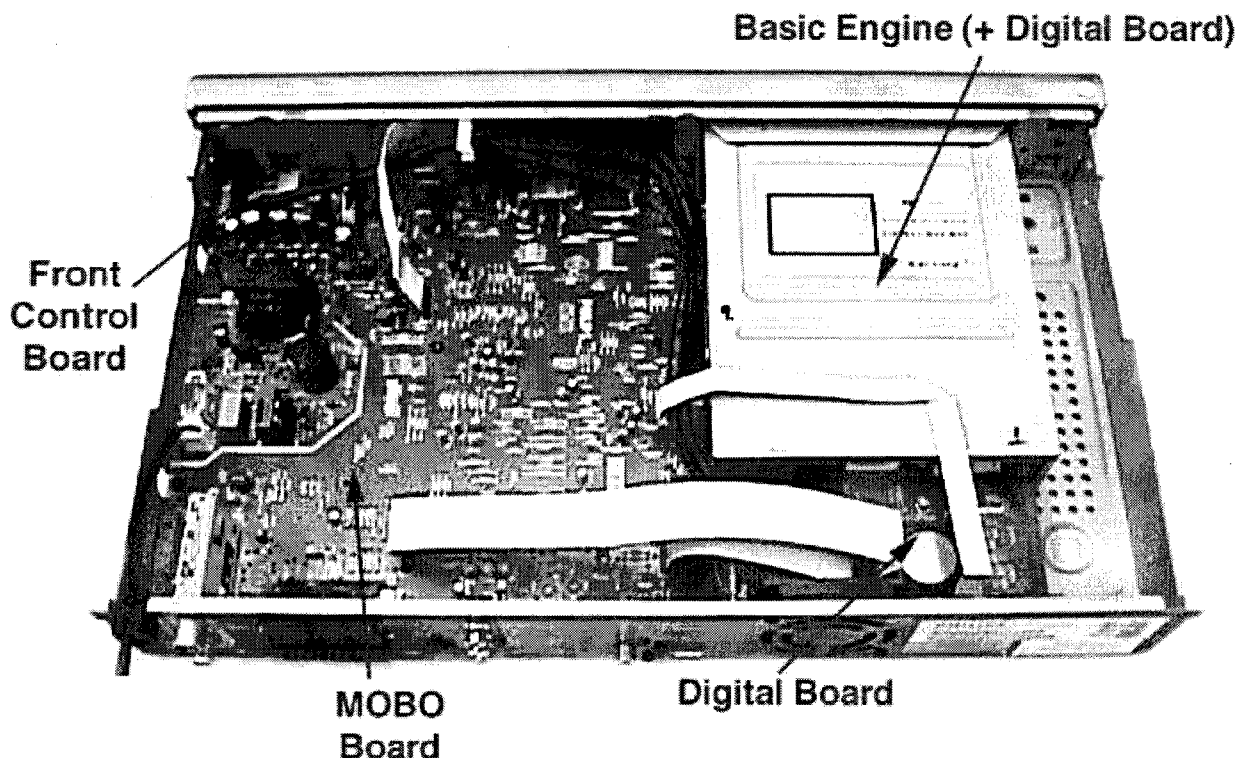
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1. Technical Specifications and Connection Facilities

1.1 PCB Locations



1.2 Diversity Matrix and Read and Write speed

Module / Pcb Application	VFM RANGE		
	DVDR610/0x/19/33	DVDR615/0x/19/33	DVDR616/0x/19/33
MOBO 04 E1 12NC: 3139 248 82891	x	x	x
VAU8041/11 DS version: E2_AV3_4 12NC: 9305 025 84111 FEBE pcb: 3104 128 09271 Drive: AV3.5	x		
VAU8041/21 DS version: E1_AV3_4 12NC: 9305 025 84121 pcb: 3104 128 09281 Drive: AV3.5		x	x
LECOLITE U4.01L DS version: OL22FEBE 12NC: 3139 247 10942 pcb: 3139 248 83791 Drive: D4.0	x		

Type of Disc (Function)	Disc Rotation Speed
Read Speed CD	CAV 7x
Read Speed DVD	CAV 4x
Write Speed DVD+RW	ZCAV 2.4x
Write Speed DVD+R	ZCAV2.4x

1.3 General:

Mains voltage	: 198V-276V
Mains frequency	: 43 Hz - 63Hz
Power consumption (record)	: 27 W
Power consumption (AV loop through)	: < 15W
Power consumption low power stand-by	: < 3 W

1.4 RF Tuner

Test equipment: Fluke 54200 TV Signal generator
Test streams: PAL BG Philips Standard test pattern

1.4.1 System:

PAL B/G, PAL D/K, SECAM L/L', PAL I

1.4.2 RF - Loop Through:

Frequency range	: 45 MHz - 860 MHz
Gain: (ANT IN - ANT OUT)	: -6 dB to 0dB

1.4.3 Radio Interference:

input voltage /3 tone method (+40 dB min)	: no limit
---	------------

1.4.4 Receiver:

PLL tuning with AFC for optimum reception

Frequency range: : 45.25 MHz - 857 MHz
 Sensitivity at 40 dB S/N : $\geq 60\text{dB}\mu\text{V}$ at 75 Ω
 (video unweighted)

1.4.5 Video Performance:

Channel 25 / 503,25 MHz,
 Test pattern: PAL BG PHILIPS standard test pattern,
 RF Level 74 dBV
 Measured on SCART 1
 Frequency response: : 0.1- 4.00 MHz \pm 3dB
 Group delay (0.1 MHz - 4.4 MHz) : 0 nsec \pm 150nsec

1.4.6 Audio Performance:

Audio Performance Analogue - HiFi:

Frequency response at SCART 1
 (L+R) output: : 100 Hz - 12 kHz / 0 \pm 3dB
 S/N according to DIN 45405, 7, 1967 :
 and PHILIPS standard test pattern
 video signal: : $\geq 50\text{dB}$, unweighted
 Harmonic distortion (1 kHz, \pm 25 kHz deviation): : $\leq 1.5\%$

Audio Performance NICAM:

Frequency response at SCART
 1(L+R) output: : 40 Hz - 15 kHz 0 \pm 3dB
 S/N according to DIN 45405, 7, 1967 :
 and PHILIPS standard test pattern
 video signal: : $\geq 60\text{dB}$ unweighted
 Harmonic distortion (1 kHz): : $\leq 0.5\%$

1.4.7 Tuning

Automatic Search Tuning

scanning time without antenna : typ. 3 min.
 stop level (vision carrier) : $\geq 37\text{dB}\mu\text{V}$
 Maximum tuning error of a recalled program : $\pm 62.5\text{kHz}$
 Maximum tuning error during operation : $\pm 100\text{kHz}$

Tuning Principle

automatic B,G, I, DK and L/L'detection
 manual selection in "STORE" mode

1.5 Analogue Inputs / Outputs

1.5.1 SCART 1 (Connected to TV)

Pin Signals:
 1 - Audio R 1.8V RMS
 2 - Audio R
 3 - Audio L 1.8V RMS
 4 - Audio GND
 5 - Blue/Chroma GND
 6 - Audio L
 7 - Blue out/
 Chroma in 0.7Vpp \pm 0.1V into 75 Ohm (*)
 8 - Function
 switch <2V = TV
 >4.5V / <7V = asp. ratio 16:9 DVD
 >9.5V / <12V = asp. ratio 4:3 DVD
 9 - Green GND
 10 - P50 control
 11 - Green 0.7Vpp \pm 0.1V into 75 Ohm (*)
 12 - Nc
 13 - Red/Chroma GND
 14 - fast switch GND

15 - Red out/
 Chroma out 0.7Vpp \pm 0.1V into 75 Ohm (*)
 $\pm 3\text{dB}$ 0.3Vpp Chroma (burst)
 16 - fast switch
 RGB/ CVBS or Y <0.4V into 75 Ohm = CVBS
 >1V / <3V into 75 Ohm = RGB
 17 - Y/CVBS GND OUT
 18 - Y/CVBS GND IN
 19 - CVBS/Y 1Vpp \pm 0.1V into 75 Ohm (*)
 20 - CVBS/Y
 21 - Shield

1.5.2 SCART 2 (Connected to AUX)

Pin Signals:

1 -Audio R 1.8V RMS
 2 -Audio R
 3 -Audio L 1.8V RMS
 4 -Audio GND
 5 -Blue/Chroma GND
 6 -Audio L
 7 -Blue in/
 Chroma out $\pm 3\text{dB}$ 0.3Vpp Chroma (burst)
 8 -Function
 switch
 9 -Green GND
 10 -P50 control
 11 -Green in
 12 -Nc
 13 -Red/Chroma GND
 14 -fast switch GND
 15 -Red in/Chroma in
 16 -fast switch
 RGB/ CVBS or
 Y
 17 -CVBS GND OUT
 18 -CVBS GND IN
 19 -CVBS/Y/RGB
 sync 1Vpp \pm 0.1V into 75 Ohm (*)
 20 -CVBS/Y
 21 -Shield

(*) for 100% white

1.5.3 Audio/Video Front Input Connectors

Audio - Cinch

Input voltage : 2.2 Vrms
 Input impedance : >10k Ω

Video - Cinch

Input voltage : 1 Vpp \pm 3dB
 Input impedance : 75 Ω

Video - YC (Hosiden)

According to IEC 933-5
 Superimposed DC-level on pin 4 (load > 100k Ω)
 < 2.4V is detected as 4:3 aspect ratio
 > 3.5V is detected as 16:9 aspect ratio

Input voltage Y : 1Vpp \pm 3dB
 Input impedance Y : 75 Ω
 Input voltage C : burst 300 mVpp \pm 3 dB
 Input impedance C : 75 Ω

1.5.4 Audio/Video Output rear Connectors

Audio- Cinch

Output voltage : 2Vrms max.
 Output impedance : >10k Ω

Video- Cinch

Output voltage : 1 Vpp \pm 3dB

Output impedance : 75 Ω

Video - YC (Hosiden)

According to IEC 933-5

Superimposed DC-level on pin 4 (load > 100k Ω)

< 2.4V is detected as 4:3 aspect ratio

> 3.5V is detected as 16:9 aspect ratio

Output voltage Y : 1Vpp +10/-15%

Output voltage C : 300mVpp +1/-4dB

Specification of consumer use digital VCR's using 6.3 mm magnetic tape - dec.1994

Mechanical connection according:
Annex A of 61883-1

1.10 P50 System Control

Via SCART pin nr 10

1.11 Dimensions and Weight

Height of feet : 5.5mm
Apparatus tray closed : WxDxH :435 x 285x 65mm
Apparatus tray open : WxDxH :435 x 422x 65mm
Weight without packaging : app. 4 kg \pm 0.5 kg
Weight in packaging : app. 6.5 kg

1.12 Laser Output Power & Wavelength

1.12.1 DVD

Output power during reading : 0.8mW
Output power during writing : 20mW
Wavelength : 660nm

1.12.2 CD

Output power : 0.3mW
Wavelength : 780nm

1.6 Video Performance

All outputs loaded with 75 Ohm

SNR measurements over full bandwidth without weighting.

1.6.1 SCART (RGB)

SNR : > -65 dB on all output
Bandwidth : 4.8 MHz \pm 2dB

1.7 Audio Performance CD

1.7.1 Cinch Output Rear

Output voltage 2 channel mode : 2Vrms \pm 2dB
Channel unbalance (1kHz) : <1dB
Crosstalk 1kHz : >95dB
Crosstalk 16Hz-20kHz : >87dB
Frequency response 20Hz- 20kHz : \pm 0.2dB max
Signal to noise ratio : >85 dB
Dynamic range 1kHz : >83dB
Distortion and noise 1kHz : >83dB
Distortion and noise 16Hz-20kHz : >75dB
Intermodulation distortion : >70dB
Mute : >95dB
Outband attenuation: : >40dB above 30kHz

1.7.2 Scart Audio

Output voltage 2 channel mode : 1.6Vrms \pm 2dB
Channel unbalance (1kHz) : <1dB
Crosstalk 1kHz : >85dB
Crosstalk 16Hz-20kHz : >70dB
Frequency response 20Hz- 20kHz : \pm 0.2dB max
Signal to noise ratio : >80 dB
Dynamic range 1kHz : >75dB
Distortion and noise 1kHz : >75dB
Distortion and noise 16Hz-20kHz : >50dB
Intermodulation distortion : >70dB
Mute (spin-up, pause, access) : >80dB
Outband attenuation: : >40dB above 25kHz

1.8 Digital Output

1.8.1 Coaxial

CDDA/LPCM (incl MPEG1) : according IEC958
MPEG2, AC3 audio : according IEC1937
DTS : according IEC1937, amendment 1

1.9 Digital Video Input (IEEE 1394)

1.9.1 Applicable Standards

Implementation according:

IEEE Std 1394-1995

IEC 61883 - Part 1


IEC 61883 - Part 2 SD-DVCR (02-01-1997)

2. Safety Information, General Notes

2.1 Safety Instructions

2.1.1 General Safety

Safety regulations require that during a repair:

- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol , only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:

- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
 1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
 2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
 3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
 4. Repair or correct unit when the resistance measurement is less than 1 MΩ.
 5. Verify this, before you return the unit to the customer/user (ref. UL-standard no. 1492).
 6. Switch the unit 'off', and remove the wire between the two pins of the mains plug.

2.1.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser Device Unit

Type	: Semiconductor laser GaAlAs
Wavelength	: 650 nm (DVD) : 780 nm (VCD/CD)
Output Power	: 20 mW (DVD+RW writing) : 0.8 mW (DVD reading) : 0.3 mW (VCD/CD reading)
Beam divergence	: 60 degree




Figure 2-1

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

2.2 Warnings

2.2.1 General

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, ) . Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential.
Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the live voltage section. The primary side of the power supply (pos. 1005), including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off!'). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is 'on'.

2.2.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

CAUTION VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM
 ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING UNDGÅ UDSÆTTELSE FOR STRÅLING
 ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN
 VARNING SYNLIG OCH OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD BETRÄKTA EJ STRÅLEN
 VARO! AVATT AESSA OLET ALTTIIN NÄKYVÄLLE JA NÄKYMÄTTÖMÄLLE LASER SÄTEILYLLÄ. ÄLÄ KATSO SÄTEESEEN
 VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRÄHLUNG WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETZEN
 DANGER VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM
 ATTENTION RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE EXPOSITION DANGEREUSE AU FAISCEAU

Figure 2-2

2.2.3 Notes

Dolby

Manufactured under licence from Dolby Laboratories. "Dolby", "Pro Logic" and the double-D symbol are trademarks of Dolby Laboratories. Confidential Unpublished Works.
 ©1992-1997 Dolby Laboratories, Inc. All rights reserved.



Figure 2-3

Trusurround

TRUSURROUND, SRS and symbol (fig 2-4) are trademarks of SRS Labs, Inc. TRUSURROUND technology is manufactured under licence from SRS labs, Inc.



Figure 2-4

Video Plus

"Video Plus+" and "PlusCode" are registered trademarks of the Gemstar Development Corporation. The "Video Plus+" system is manufactured under licence from the Gemstar Development Corporation.



Figure 2-5

Macrovision

This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners.

Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

3. Directions For Use

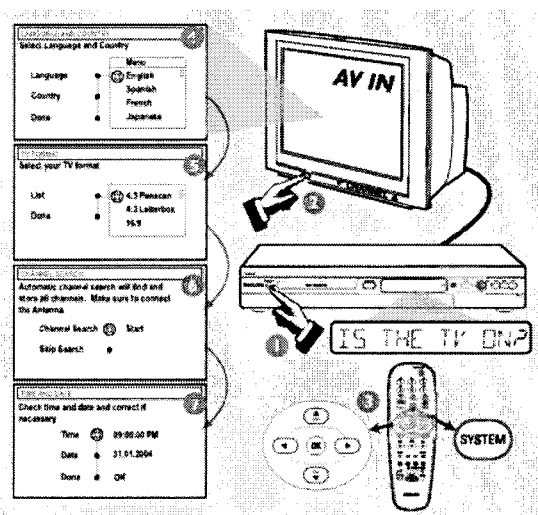
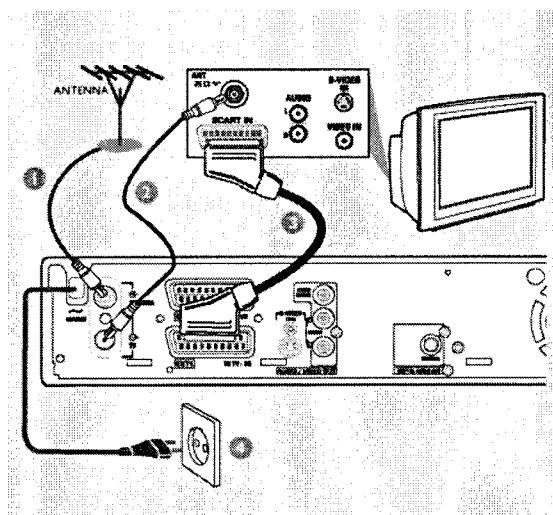
The following excerpt of the Quick Use Guide serves as an introduction to the set.

The complete Direction for Use can be downloaded in different languages from the internet site of Philips Customer Care Center:
www.p4c.philips.com

QUICK USE GUIDE

DVDR610
 DVDR615
 DVDR616

12nc: 3139 246 14051



1 First connect

- 1 Remove the antenna cable plug from your TV (or Satellite Receiver/Cable Box). Connect it to the **ANTENNA IN** socket at the back of the DVD recorder.
- 2 Use the supplied antenna cable to connect the DVD recorder's **TV OUT** socket to the antenna input socket at the back of your TV set.
- 3 Use the supplied scart cable to connect the DVD recorder's **EXT 1 TO TV-I/O** socket to the SCART socket at the back of your TV set.
- 4 Connect the power cable from the DVD recorder's **~ MAINS** to the power supply.

Helpful Hints:

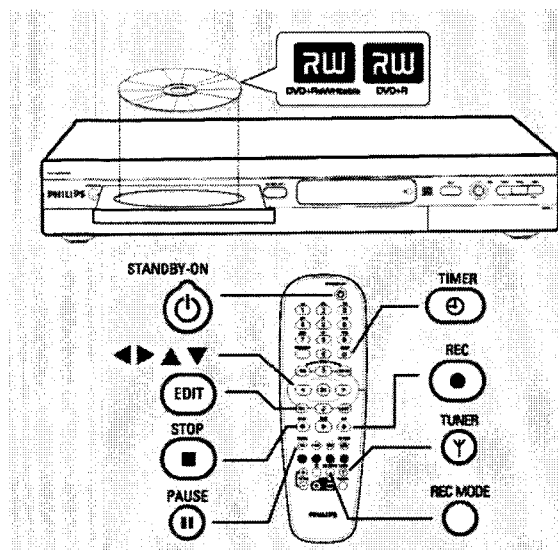
If your TV does not have the above-mentioned connectors, please refer to the user manual for more information on others possible connection to your TV set.

2 Start first installation

- 1 Press **STANDBY-ON** on the DVD recorder to switch it on.
- 2 Switch on the TV set.
If the first installation menu does not appear, press the **CHANNEL** button on the TV to select the correct video in channel, for example, 'EXT', '0', or 'AV'.
- 3 Press to select an item in the menu.
Press to access the selected item's options.
Press to confirm your selection.
Once completed, select { **Done** } in the menu and press **OK** to continue.
- 4 { **Language and Country** } menu appears.
{ **Language** } – select on-screen display language.
{ **Country** } – select country of your residence.
- 5 { **TV Format** } menu appears.
{ **List** } – select TV screen display.
- 6 { **Channel Search** } menu appears.
Press **OK** to start automatic TV channel search.
→ Once completed, the total number of channels found appears on the TV.
- 7 { **Time and Date** } menu appears.
If the time and date shown on the TV are not correct, press to enter the respective time/date field. Press to change the first digit and press to go to the next digit field. Once completed, press **OK**.
- 8 Press to select { **Done** } and press **OK** to save the changes.
→ The initial installation is now completed.

The DVD recorder is ready for use!

... cont.



Preparation before recording :

- ① Insert a recordable DVD+R(W).
→ If the DVD+RW already contained recordings, you have to select an empty title in the Index Picture screen to start a new recording.
→ For DVD+R, the recording will make at the end of the disc automatically.
- ② Press **REC MODE** to select a recording mode ({M1}, {M2}, {M2x}, {M3}, {M4}, {M6} or {M8}). It defines the picture quality and the maximum recording time for a disc. Refer to the "Recording settings" in the user manual for more information.

3 Start a manual recording

- ① Press **TUNER** on the remote control to see the TV programmes, then press **▲ ▼** to select the programme number (or external input channel, for example EXT1, CAM1) you wish to record.
→ The input channel must correspond to the socket to which you have connected the additional device.
- ② Press **REC ●** to start recording.
- ③ If required, you can press **REC ●** twice to start a 30-minute recording. Each time you press **REC ●** button, you will add 30 minutes to the recording time.
- ④ During recording, you may press **PAUSE II** to pause the recording and press **REC ●** to continue.
- ⑤ To stop the recording, press **STOP ■**.
→ Wait until the 'MENU UPDATE' message disappears from the display panel before you remove the disc.

To play the DVD+R on other DVD players, you must finalise it first

- ① Press **EDIT** on the remote control.
- ② Press **▲ ▼** to select { **Finalise** } in the menu and press **OK** to start finalising the DVD+R.

Once finalised, no further recordings and editings can be made to the DVD+R. Unfinalise a DVD+R is not possible.

4 Prepare timer recording

- ① Press **TIMER**.
→ The timer overview appears.
- timer overview

timer entry screen
- ② Press the matching colour coded button on the remote control to select { **New Timer** }.
→ The timer entry screen appears.
 - ③ Use **▲ ▼ ◀ ▶** to select the appropriate entry field.
 - ④ Use **▲ ▼ ◀ ▶** to enter the programme information (or use the alphanumeric keypad 0-9), then press **OK** to confirm.
 - ⑤ Once completed, press the matching colour coded button on the remote control to select { **Store** }.
→ The timer overview screen will appear showing the stored programme information.
 - ⑥ To exit, press **TIMER**.
 - ⑦ Press **STANDBY-ON** to switch off the DVD recorder.
→ The DVD recorder must be off in order for the timer recording to occur, at least five minutes before the timer recording is set to begin.



Detailed playback features and additional functions are described in the accompanying user manual.

4. Mechanical Instructions

4.1 Dismantling and Assembly of the Set

For item numbers please see the exploded views in chapter 10.

4.1.1 Front Panel Assembly

- After removing the top cover, remove tray front 134+138, see picture 4-1
- Remove the three screws 188
- Release the two snap hooks on the sides and remove the front assembly
- Remove the 4 screws 186 to remove the front plate 184, see picture 4-2

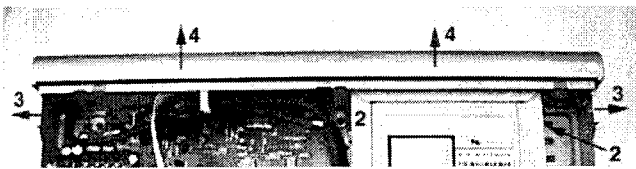
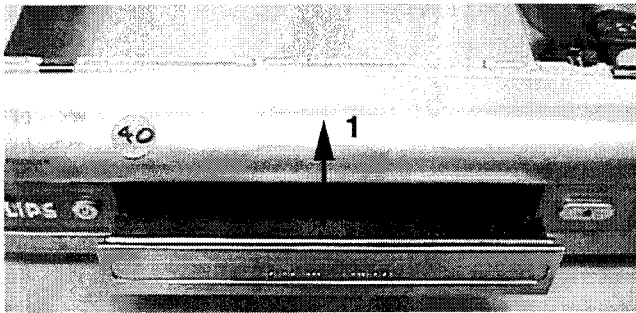


Figure 4-1

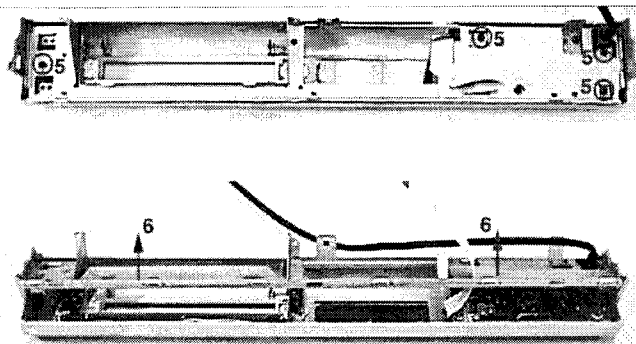


Figure 4-2

4.1.2 Basic Engine

- Remove the Front Panel Assembly as given in 4.1.1
- Remove the 6 screws 260, 269 to free the Basic Engine
- Remove the dust cover assembly 147 and 148
- Loosen 2 screws to remove bracket 256
- Loosen 4 screws to remove the Basic Engine metal casing
- Place the Basic Engine in the service position

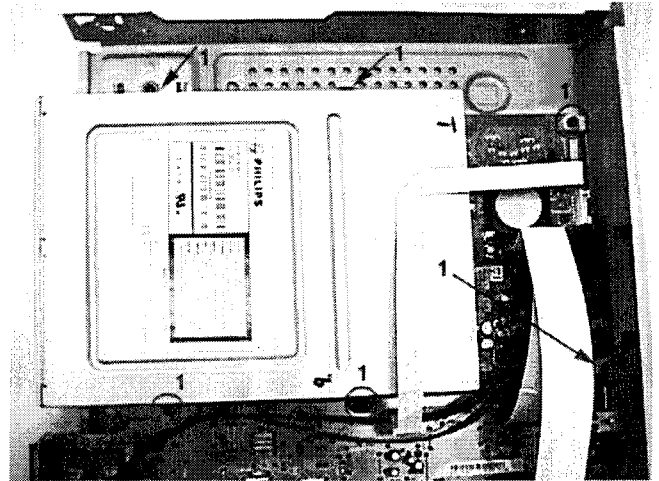


Figure 4-3

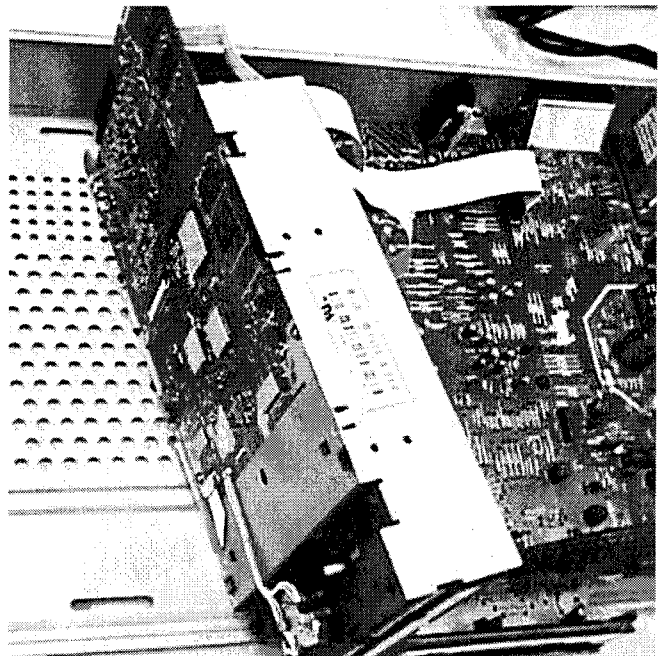


Figure 4-4

4.1.3 MOBO Board

- Remove the Front Panel assembly as given in 4.1.1
- Remove 6 screws 246 and 254
- Remove 4 screws 270
- Service position is achieved by flipping the MOBO board above the Basic Engine

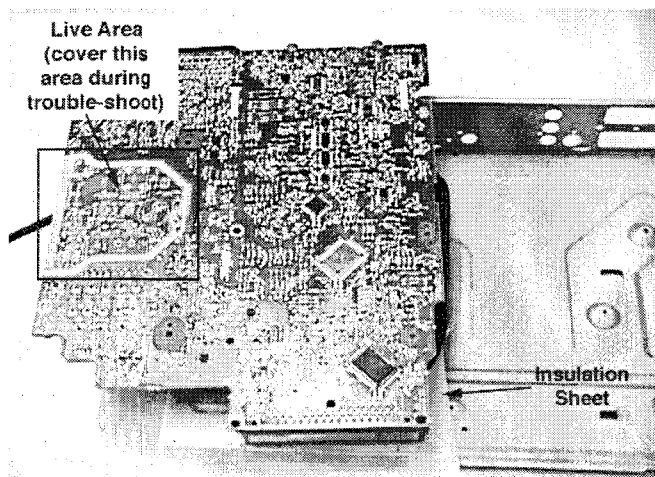


Figure 4-5

4.2 Dismantling and assembly of the Basic Engine

4.2.1 General

Follow the dismantling instructions in described order.
Do not place the unit with its PCB on a hard surface (e.g. table), as it could damage the components on it.
Always place something soft (a towel or foam cushion) under it.
Never touch the lens of the OPU.
Take sufficient ESD measures during handling.

4.2.2 Dismantling the FEBE Board / Lecolite (LECO) Board

- Remove 4 screws to remove the metal case 150+180
- Remove 2 screws to separate the P.C. board 179 or 180 from the main Loader/Drive assembly

Note: After exchange of the PCB (or the Drive mechanism) the complete Basic Engine has to be adjusted! Refer to chapter 8 for adjustment instructions!

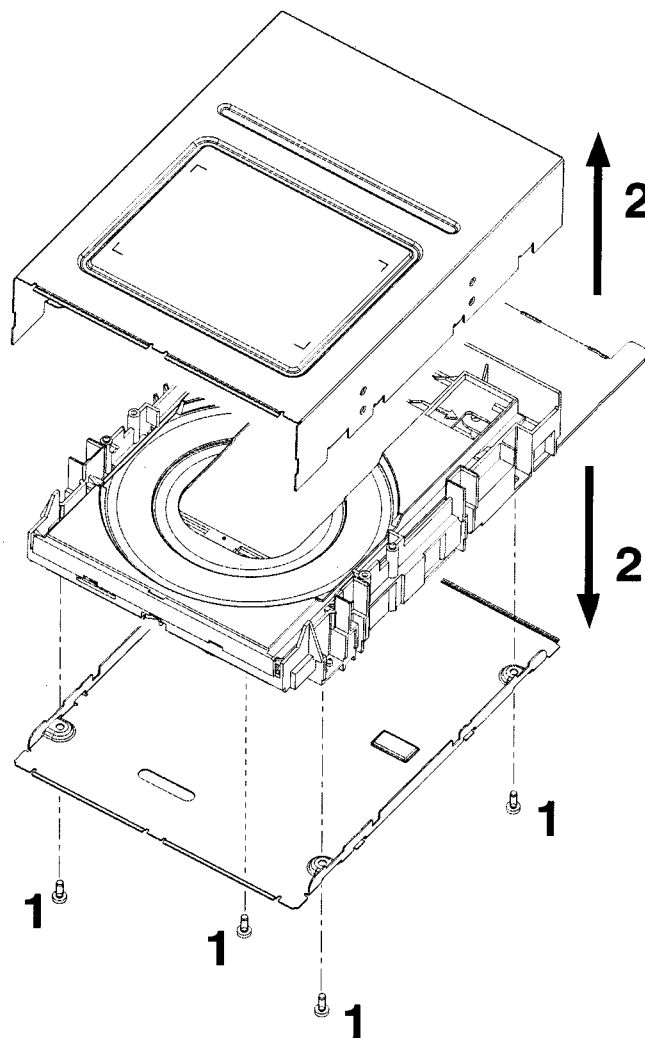


Figure 4-6 Basic Engine Module dismantling

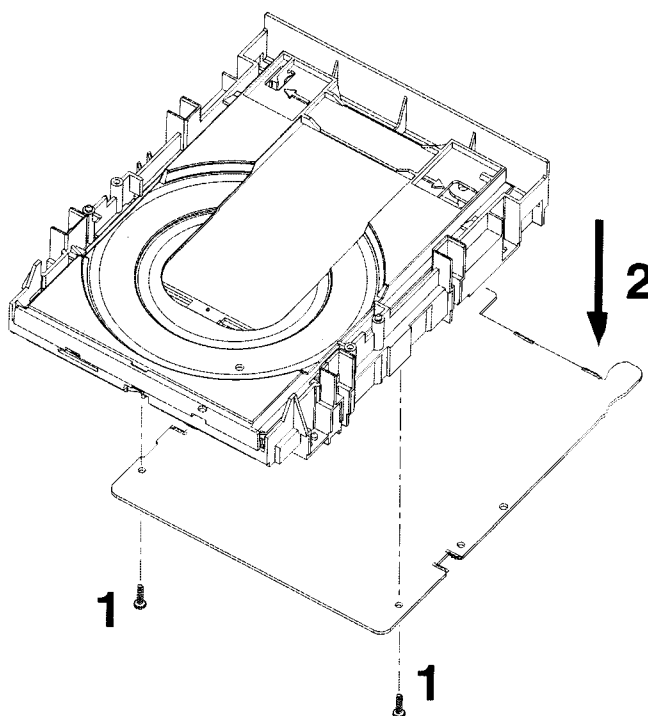


Figure 4-7 Remove P.C. board

4.2.3 Dismantling the Tray

- Remove the encasing as described in 4.2.2
- Disengage the two holders that fix the tray [1] and pull out the tray [2]

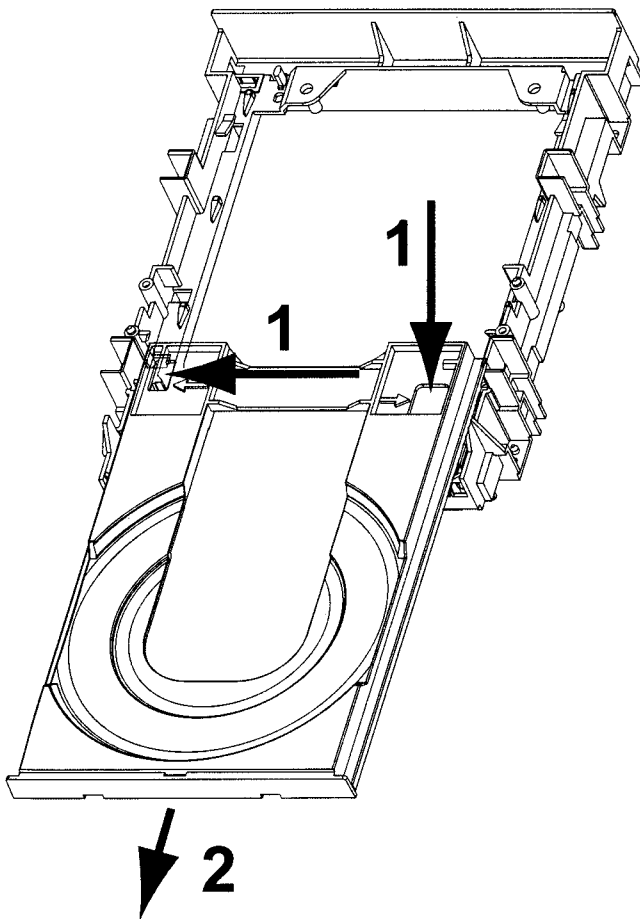


Figure 4-8 Remove Tray

4.2.4 DVD-M (Drive Mechanism)

Caution: Never try to align or repair the DVD-Module itself! Only the factory can do this properly. Service engineers are only allowed to exchange the sledge motor assy. After Exchanging the DVD-M (or the PCB) the complete drive has to be adjusted! Refer to chapter 8 for adjustment instructions!

- Remove encasing and P.C. board as described in 4.2.2
- Remove the Sealing strip 5 by uncatching it
- Loosen the 4 screws/washer [1] to remove the DVD-M [2]

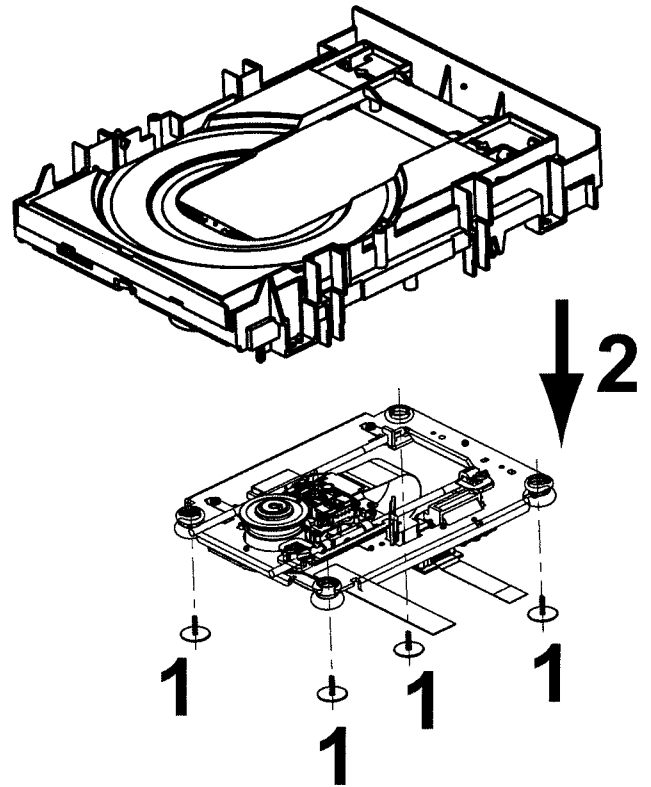


Figure 4-9 Remove DVD-M

4.2.5 Re - assembly

To re-assemble the module, do all processes in reverse order. Take care of the following:

- **Heat Paths:** Put the 5 heat paths (gray rubber pieces) back to their position on the ICs.
- **Complete module:** Place all wires/cables in their original positions
- **Emergency opening slot:** Be sure that the slot for the emergency tray opener is covered by adhesive tape!

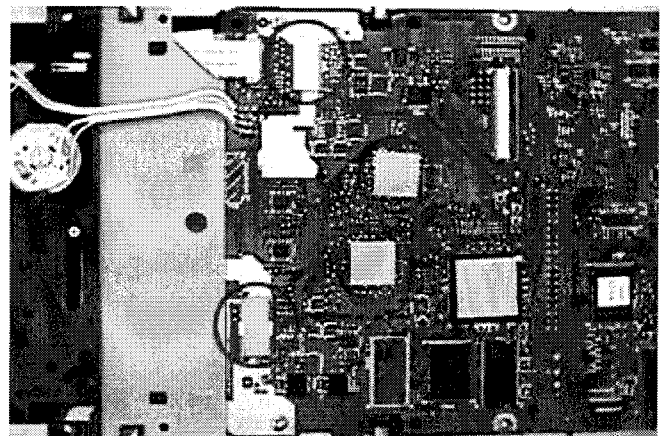
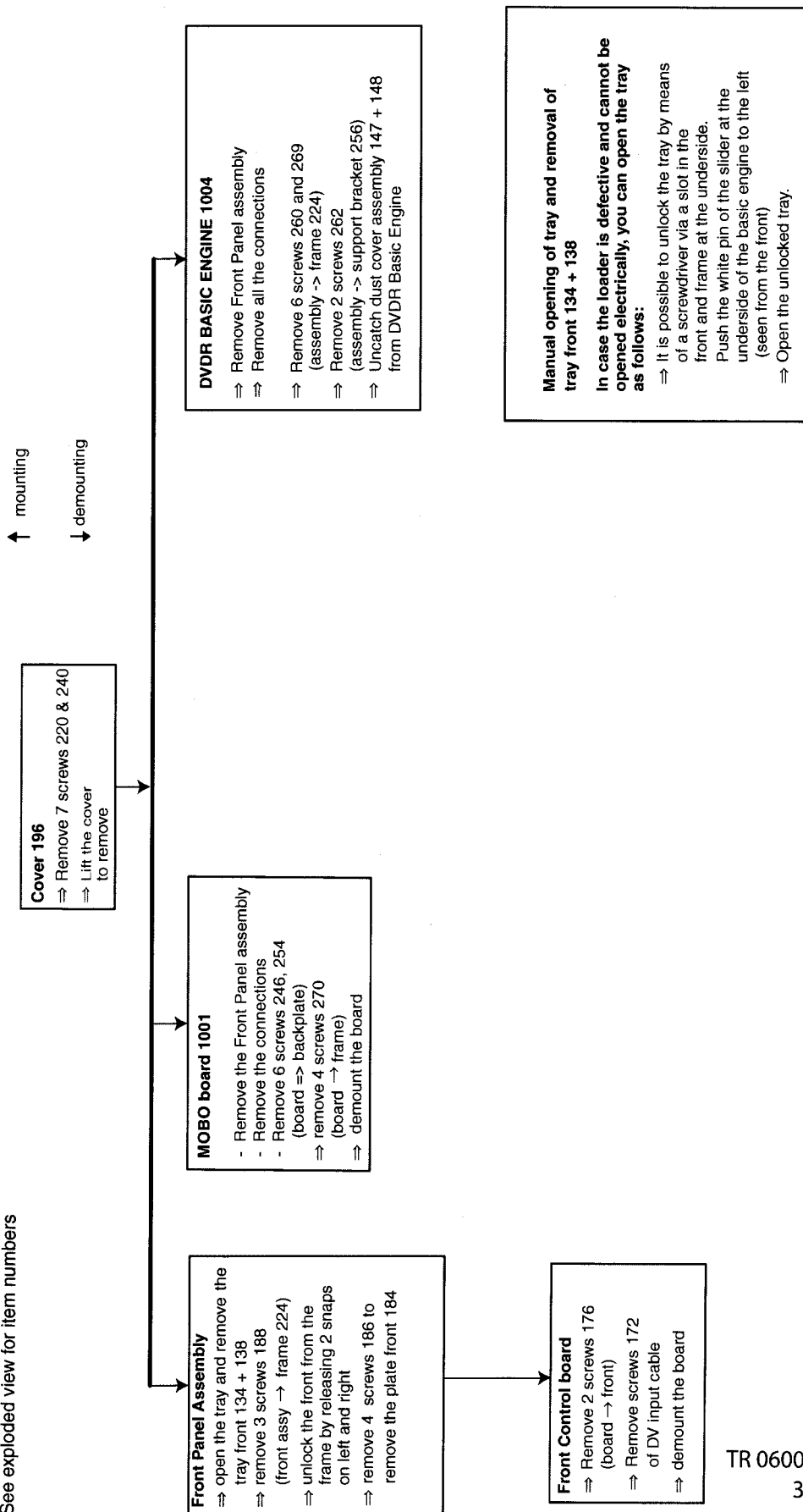


Figure 4-10 Heat Paths

4.3 Dismantling Instructions

DISMANTLING INSTRUCTIONS

See exploded view for item numbers



TR 06003_003
300504

Figure 4-11

5. Diagnostic Software

Due to the complexity of the DVD recorder, the time to find a defect in the recorder can become long. To reduce this time, the recorder has been equipped with Diagnostic and Service software (DS). The DS offers functionality to diagnose the DVDR hardware and tests the following:

- Interconnections between components
- Accessibility of components
- Functionality of the audio and video paths

This functionality can be accessed via several interfaces:

1. End user/Dealer script interface
2. Command Interface

5.1 End User/Dealer Script Interface

5.1.1 Description

The End user/Dealer script interface gives a diagnosis on a stand alone DVD recorder. During this mode, a number of hardware tests (nuclei) are automatically executed to check if the recorder is faulty. The diagnosis is simply a "fail" or "pass" message. If the message "FAIL" appears on the display, there is apparently a failure in the recorder. If the message "PASS" appears, the nuclei in this mode have been executed successfully. There can be still a failure in the recorder because the nuclei in this mode don't cover the complete functionality of the recorder.

5.1.2 Structure

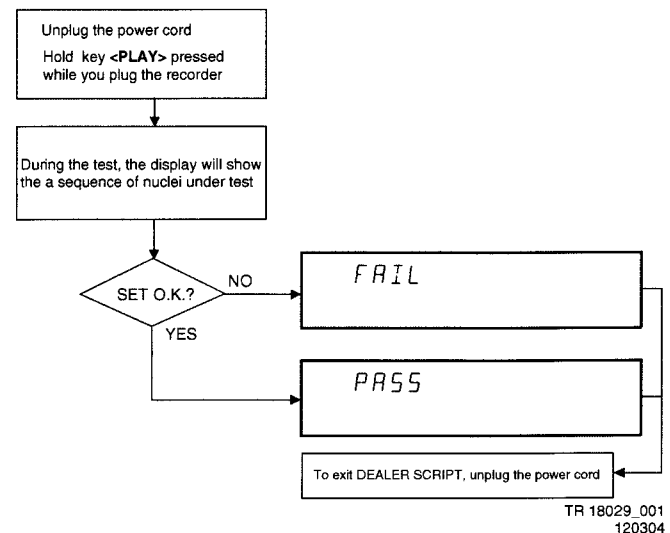


Figure 5-1

The End use/Dealer script executes all diagnostic nuclei that do not need any user interaction and are meaningful on a standalone DVD recorder.

5.1.3 Contents

Included tests:	1.DS_ANAB_COMMUNICATIONECHO_NUC 2.DS_DCB_COMMUNICATIONECHO_NUC 3. DS_BROM_COMMUNICATION_NUC 4. DS_SYS_SETTINGSDISPLAY_NUC 5. DS_CHR_DEVTYPEGET_NUC 6. DS_CHR_INT_PIC_NUC 7. DS_CHR_DMA_NUC 8. DS_BROM_WRITEREAD_NUC 9. DS_NVRAM_COMMUNICATION_NUC 10. DS_NVRAM_WRITEREAD_NUC 11. DS_SDRAM_WRITEREADFAST_NUC 12. DS_FLASH_WRITEREAD_NUC 13.DS_FLASH_CHECKSUMPROGRAM_NUC 14.DS_SYS_HARDWAREVERSIONGET_NUC 15. DS_VIP_DEVTYPEGET_NUC 16. DS_VIP_COMMUNICATION_NUC 17. DS_DVIO_LINKDEVTYPEGET_NUC 18. DS_DVIO_PHYDEVTYPEGET_NUC 19. DS_DVIO_LINKCOMMUNICATION_NUC 20. DS_DVIO_PHYCOMMUNICATION_NUC 21.DS_PSCAN_COMMUNICATIONDENC_NUC 22.DS_PSCAN_COMMUNICATIONDEINTERLACER_NUC 23. DS_BE_COMMUNICATIONECHO_NUC 24.DS_ANAB_COMMUNICATIONIICNVRAM_NUC 25.DS_ANAB_COMMUNICATIONIICTUNER_NUC 26.DS_ANAB_COMMUNICATIONIICSOUNDPROCESSOR_NUC 27.DS_ANAB_COMMUNICATIONIICAVSELECTOR_NUC 28. DS_ANAB_CHECKSUMPROGRAM_NUC
-----------------	---

5.2 Player Script Interface

5.2.1 Trade Mode

TRADE MODE

When the recorder is in Trade Mode, the recorder cannot be controlled by means of the front key buttons, but only by means of the remote control.

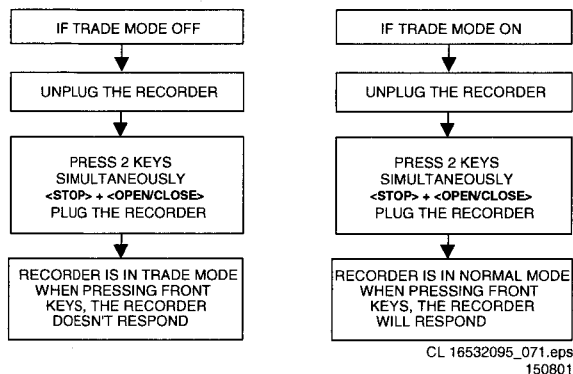


Figure 5-2

5.2.2 Virgin mode

If you want that the recorder starts up in Virgin mode, follow this procedure:

- Unplug the recorder
- plug the recorder again while you keep the STAND BY/ON key pressed
- the set starts up in Virgin mode.

5.3 Menu and Command Mode Interface

5.3.1 Nuclei Numeration

Each nucleus has a unique number of four digits. This number is the input of the command mode.

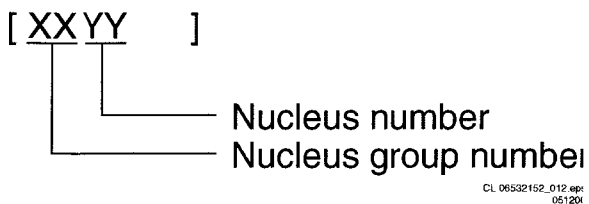


Figure 5-3

Group number	Group name
0	Scripts
1	Codec (e.g. Chrysalis, Leco)
2	Boot EEPROM
3	NVRAM
4	SDRAM
5	Flash
6	Video Input Processor
7	DVIO
8*	Progressive Scan
9	Basic Engine
10*	Display and Control Board
11*	Analogue Board
12	System
13*	Electronic Program Guide Board
14*	PCMCIA

15*	HDMI
16	Analogue Slave Processor
17	Analogue Board EEPROM
18	Video Matrix
19	Audio Matrix
20	Front End
21*	Hard Disk
22*	Digital Terrestrial Tuner Module

* Not applicable for DVDR610, DVDR615 & DVDR616 Range

5.3.2 Error Handling

Each nucleus returns an error code. This code contains six numerals, which means:

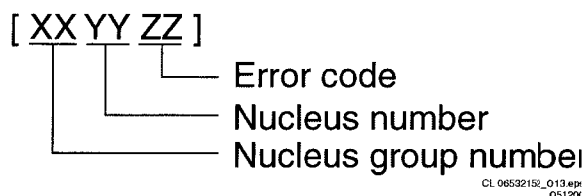


Figure 5-4

The nucleus group numbers and nucleus numbers are the same as above.

5.3.3 Command Mode Interface

Set-Up Physical Interface Components

Hardware required:

- Service PC
- one free COM port on the Service PC
- special cable to connect DVD recorder to Service PC

The service PC must have a terminal emulation program (e.g. Hyperterminal) installed and must have a free COM port (e.g. COM1). Activate the terminal emulation program and check that the port settings for the free COM port are: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The free COM port must be connected via a special cable to the RS232 port of the DVD recorder. This special cable will also connect the test pin, which is available on the connector, to ground (i.e. activate test pin).

Code number of PC interface cable: 3122 785 90017

Activation of Diagnostic Software

1. Pull the mains cord from the recorder and reconnect it again (reboot).
2. The next welcome message will appear on the PC:

Welcome screen D&S program

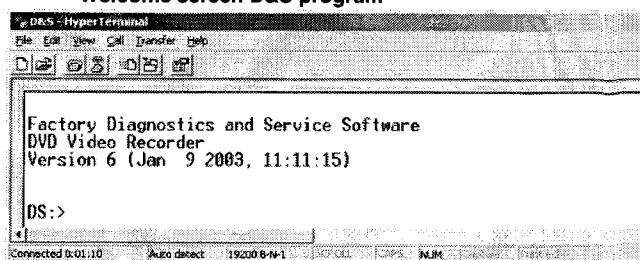


Figure 5-5

Now, the prompt 'DS:>' will appear. The diagnostic software is now ready to receive commands. The commands that can be given are the numbers of the nuclei. If you see above shown screen, continue with paragraph 'Nuclei Codes'.

- It is possible that the next messages will appear when starting the DVD+RW for the first time

Error messages D&S program

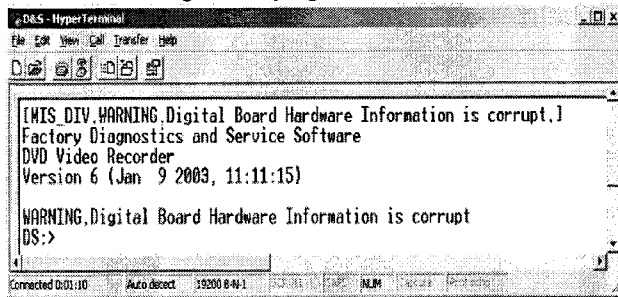


Figure 5-6a

Error messages D&S program

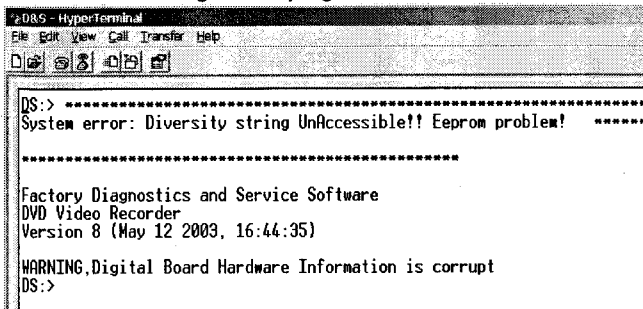


Figure 5-6b

In these cases, the boot EEPROM of the Digital Board does not contain the required string with the hardware information. To update the Digital Board with the correct string, nucleus 1226 must be executed.

See next section 'Diversity String Input'. There can also be the next error message.

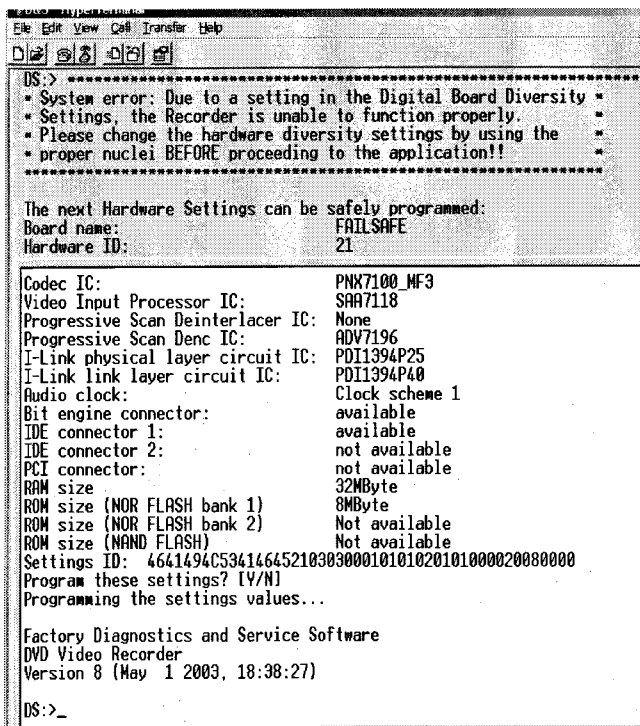


Figure 5-6c

Enter "Y" to program a safe string. With this automatically generated string the board will work in principle but it has to be checked if all board settings were detected correctly.

Diversity String Input

- Execute nucleus 1226 to enter the string. Please see chapter 8.4 for details

Nucleus 1226 execution with string

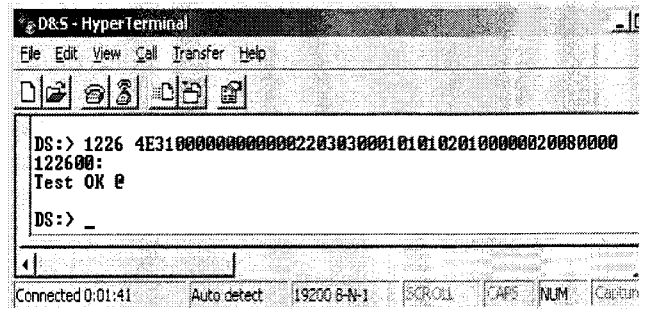


Figure 5-7

- To check if the hardware info is filled correctly, you can execute nucleus 1228.

Nucleus 1228 info example

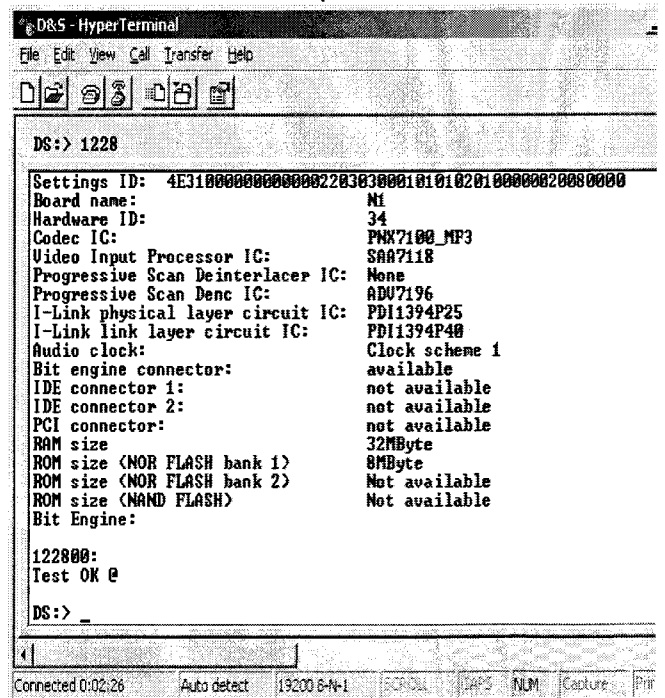


Figure 5-8

- Exit the 'Terminal' program.
- Reboot the DVD recorder to allow the software to start.

Command overview Digital Board

Below you will find an overview of the nuclei, their numbers, and their error codes. This overview is preliminary and subject to modifications.

Note: AV3 in the overview includes also the AV3.5 drive.

CODEC HOST CONTROLLER (CHR)

Nucleus Name	DS_CHR_DevTypeGet	
Nucleus Number	100	
Description	Retrieves the device id, the module ids and revisions of the Codec and returns them to the stdout port.	
Technical	- Determine the codec id by means of comparing version ids of the modules.- Read the module-id register of every module and display it to the user.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10000	Getting the information succeeded
	10001	Wrong codec id detected
Example	DS:> 100 010000: Device ID 7100 Codec ID PNX7100_C F-BCU (0x0102) 1.0 INTC (0x011d) 1.0 PCI-XIO(0x0113) 1.0 SIF (0x013b) 1.0 EJTAG (0x0104) 0.1 S-BCU (0x0102) 1.0 (0x010a) 1.0 CONFIG (0x013f) 1.1 RESET (0x0123) 1.0 DEBUG (0x0116) 0.0 UART0 (0x0107) 0.1 UART1 (0x0107) 0.1 UART2 (0x0107) 0.1 UART3 (0x0107) 0.1 I2C0 (0x0105) 0.1 I2C1 (0x0105) 0.1 GPIO (0x013c) 1.0 SYNC (0x013a) 1.0 DISPO (0xa015) 1.12 DISP1 (0xa00f) 1.1 OSD (0x0136) 0.1 SPU (0xa00e) 0.0 MIXER (0x0137) 1.0 DENC (0x0138) 1.0 CCIR (0x0139) 1.0 VDEC (0x0133) 0.2 PARSER (0xa00d) 0.0 DV (0xa00c) 0.0 BEI (0xa00a) 0.1 IDE (0xa009) 0.1 SGDX (0xa008) 1.0 BYTE (0xa00b) 0.1 OUTPUT (0xa003) 1.0 ACOMP (0xa000) 1.0 VFE (0xa001) 0.1 VCOMP (0xa002) 1.0 SCR (0x0000) 0.0 SIFF (0xa011) 0.1 WMD (0xa010) 0.0 AUDIO0 (0xa015) 1.12 AUDIO1 (0xa00f) 1.1 PSCAN (0xa018) 0.1 Test OK @	

Nucleus Name	DS_CHR_TestImageOn
Nucleus Number	101
Description	Generates a test-image of a selected video standard on selected video output on the digital board. When no input is given, the default values will be used (see user input description below). Make sure to use the proper nuclei to route the video signal on the analogue board to get the videosignal to the proper output.
Technical	-Validate the user input. -Initialise the SYNC module. -Initialise the DISPLAY module. -Initialise the MIXER module. -Initialise the DENC module. -Set the selected video standard. -Generate the selected test image in memory. -Start the DISPLAY module. -Start the MIXER module. -Start the DENC module according to the selected test image id.
Execution Time	6 seconds.

Nucleus Name	DS_CHR_TestImageOn		
User Input	<p>The user has to decide which test image, video standard and video output must be used:</p> <p>Test image id:</p> <p>0 VERTICAL_COLOURBAR (default)</p> <p>1 HORIZONTAL_COLOURBAR</p> <p>2 WHITE</p> <p>3 YELLOW</p> <p>4 CYAN</p> <p>5 GREEN</p> <p>6 MAGENTA</p> <p>7 RED</p> <p>8 BLUE</p> <p>9 BLACK</p> <p>10 GRAY</p> <p>11 TEST_IMAGE_FOR_PROGRESSIVE_SCAN</p> <p>Video standard:</p> <p>PAL (default)</p> <p>NTSC</p> <p>Video output</p> <p>ALL CVBS and YC and RGB (default)</p> <p>CVBS</p> <p>YC</p> <p>RGB</p> <p>YUV</p> <p>PSCAN progressive scan</p>		
Error	Number	Description	
	10100	Generating the test image succeeded.	
	10101	Invalid input was provided.	
	10102	The Codec SYNC-module cannot be initialised.	
	10103	The Codec MIXER-module cannot be initialised.	
	10104	The Codec VPP-module cannot be initialised.	
	10105	The Codec DENC-module cannot be initialised.	
	10106	The digital board hardware information is corrupt	
Example	<p>DS:> 101</p> <p>010100:</p> <p>Test OK @</p> <p>DS:> 101 0 pal cvbs</p> <p>010100:</p> <p>Test OK @</p> <p>DS:> 101 4 ntsc yc</p> <p>010100:</p> <p>Test OK @</p>		

Nucleus Name	DS_CHR_TestImageOff		
Nucleus Number	102		
Description	Switches the test-image off.		
Technical	<p>-</p> <p>Stop the DENC module.</p>		
Execution Time	Less than 1 second.		
User Input	None		
Error	Number	Description	
	10200	Stopping the test image generation succeeded	
	10201	The Codec DENC-module failed.	
Example	<p>DS:> 102</p> <p>010200:</p> <p>Test OK @</p>		

Nucleus Name	DS_CHR_SineOn		
Nucleus Number	103		
Description	Generate an audio sine signal on the audio output of the digital board. Note: Left channel 6kHz, right channel 12 kHz sine. Make sure to route the signal first.		

Technical	<ul style="list-style-type: none"> - De-mute the analogue board - Set fifo parameters for audio - Set the volume - Set the I2S outputs and configuration paths - Set the decoder mode - Configure the audio decoder - Put the AC3 audio in the fifo - Send 'prepare' command to the audio decoder - Send 'play' command to the audio decoder 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	10300	The sine signal was successfully generated
	10301	The analogue board could not be de-muted
	10302	The audio decoder did not initialise
	10303	The dsp2 of the audio decoder did not configure
	10304	The dsp1 of the audio decoder did not configure
	10305	There was a delay-error before starting
	10306	Wrong input was given to the decoder function
	10307	Wrong input was given to the decoder function @ @ @ @
	10308	The audio decoder did not get into the 'prepared' state
Example	DS:> 103 010300: Test OK @	

Nucleus Name	DS_CHR_SineOff	
Nucleus Number	104	
Description	Stop generating the audio sine signal	
Technical	<ul style="list-style-type: none"> - Reset the audio block of the Codec 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10400	Switching off the audio sine signal succeeded
	10401	Failed to reset the audio decoder
Example	DS:> 104 010400: Test OK @	

Nucleus Name	DS_CHR_SineBurst	
Nucleus Number	105	
Description	Generate an audio sine signal on the audio output of the digital board for 4 seconds. Note: Left channel 6kHz, right channel 12 kHz sine with some known hick-ups	
Technical	<ul style="list-style-type: none"> - Call the DS_CHR_SineOn nucleus - Delay for 4 seconds - Call the DS_CHR_SineOff nucleus 	
Execution Time	4 seconds	
User Input	None	
Error	Number	Description
	10500	The sine signal burst was successfully generated
	10501	The delay did not succeed during the burst
	10502	The audio sine could not be generated
Example	DS:> 105 010500: Test OK @	

Nucleus Name	DS_CHR_MuteOn	
Nucleus Number	106	
Description	Mute the audio outputs of the digital board	
Technical	<ul style="list-style-type: none"> - Send the 'Mute' command to the audio decoder 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10600	Muting the audio succeeded

Example	DS:> 106 010600: Test OK @
---------	----------------------------------

Nucleus Name	DS_CHR_MuteOff	
Nucleus Number	107	
Description	De-mute the audio outputs of the digital board	
Technical	- Send the 'DeMute' command to the audio decoder	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10700	De-muting the audio succeeded
Example	DS:> 107 010700: Test OK @	

Nucleus Name	DS_CHR_DvLedOn	
Nucleus Number	108	
Description	Check the connection to the DV-LED on the digital board by switching it on	
Technical	- Write to the PIO pin to light the DV LED	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10800	Switching the DV-LED on succeeded
	10801	Switching the DV-LED on failed
Example	DS:> 108 010800: Test OK @	

Nucleus Name	DS_CHR_DvLedOff	
Nucleus Number	109	
Description	Switch off the DV-LED on the digital board	
Technical	- Write to the PIO pin to switch off the DV LED	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10900	Switching the DV-LED off succeeded
	10901	Switching the DV-LED off failed
Example	DS:> 109 010900: Test OK @	

Nucleus Name	DS_CHR_MacroVisionOn	
Nucleus Number	110	
Description	Turn on MacroVision.	
Technical	- Set some registers of the DENC module in the Codec.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	11000	Turning on MacroVision succeeded
	11001	Turning on MacroVision failed
Example	DS:> 110 011000: Test OK @	

Nucleus Name	DS_CHR_MacroVisionOff	
Nucleus Number	111	
Description	Turn off MacroVision.	
Technical	- Set some registers of the DENC module in the Codec.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	11100	Turning off MacroVision succeeded

	11101	Turning off MacroVision failed
Example	DS:> 111 011100: Test OK @	

Nucleus Name	DS_CHR_Peek	
Nucleus Number	112	
Description	Peek a value on a specified address	
Technical	<ul style="list-style-type: none"> - Check the user input - Read out the address specified - Check whether the address to be read is aligned on 4 bytes 	
Execution Time	Less than 1 second.	
User Input	The address to peek on	
Error	Number	Description
	11200	Peeking on the specified address succeeded
	11201	Peeking on the specified address failed, wrong user input
	11202	Peeking on the specified address failed due to misalignment
Example	DS:> 112 0xa0700000 011200: Value read = 0x000001BD Test OK @	

Nucleus Name	DS_CHR_Poke	
Nucleus Number	113	
Description	Poke a value on a specified address	
Technical	<ul style="list-style-type: none"> - Check the user input - Change the value on the address specified - Check whether the address to be modified is aligned on 4 bytes 	
Execution Time	Less than 1 second.	
User Input	The address to poke and the value: <address><value>	
Error	Number	Description
	11300	Poking the specified address succeeded
	11301	Poking the specified address failed, wrong user input
	11302	Poking the specified address failed due to misalignment
Example	DS:> 113 0xa0700000 0xaabbcdd 011300: Test OK @	

Nucleus Name	DS_CHR_INT_PICInterrupts	
Nucleus Number	114	
Description	Test all interrupts of the priority interrupt controller	
Technical	<ul style="list-style-type: none"> - Install interrupt handlers - Generate interrupts - Test whether all interrupts were received 	
Execution Time	Less than 1 second.	
User Input	-	
Error	Number	Description
	11400	Testing all the PIC interrupts succeeded
	11401	Testing all the PIC interrupts failed
Example	DS:> 114 011400: Test OK @	

Nucleus Name	DS_CHR_DMA_TestDMA	
Nucleus Number	115	
Description	Test the memory to memory DMA transfer	
Technical	<ul style="list-style-type: none"> - Create a block with known data in memory - Copy this block to the consecutive area using 3 different DMAs - Check whether all DMAs transferred the data properly 	
Execution Time	Less than 2 seconds.	
User Input	-	
Error	Number	Description
	11500	The testing of the DMAs succeeded
	11501	The initialisation of the DMAs failed for one or more DMA
	11502	One or more DMAs failed the test

Example	DS:> 115 011500: Test OK @
---------	----------------------------------

Boot EEPROM (BROM)

Nucleus Name	DS_BROM_Communication	
Nucleus Number	200	
Description	Check the communication between the IIC controller of the Chrysalis and the boot EEPROM	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Read something from the EEPROM 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	20000	The data is properly read so the communication is OK
	20001	The IIC bus was not accessible
	20002	There was a timeout reading the device
	20003	The IIC acknowledge was not received
	20004	An IIC-bus error occurred
	20005	The IIC bus initialisation failed
	20006	An unexpected IIC error occurred
Example	DS:> 200 020000: Test OK @	

Nucleus Name	DS_BROM_WriteRead	
Nucleus Number	201	
Description	Check whether the Boot EEPROM can be written to and read from	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Write something to the EEPROM - Read from the same location and check whether it is the same as written 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	20100	The write-read test succeeded
	20101	The write-read test failed
	20102	An IIC-bus error occurred
	20103	There was a timeout reading the device
	20104	The IIC bus was not accessible
	20105	The IIC acknowledge was not received
	20106	Got unknown IIC bus error
	20107	The IIC bus initialisation failed
Example	DS:> 201 020100: Test OK @	

NVRAM

Nucleus Name	DS_NVRAM_Communication	
Nucleus Number	300	
Description	Check the communication between the IIC controller of the Codec and the EEPROM	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Read from a location in NVRAM 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	30000	Something is properly read so the communication is OK
	30001	The IIC bus was not accessible
	30002	There was a timeout reading the device
	30003	The IIC acknowledge was not received
	30004	The communication with the device failed
	30005	The IIC bus initialisation failed
	30006	@ @ @ @ @ @

Example	DS:> 300 030000: Test OK @
---------	----------------------------------

Nucleus Name	DS_NVRAM_WriteRead	
Nucleus Number	301	
Description	Check whether the EEPROM can be written to and read from	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Backup data from location to modify - Write to location and read it back again - Write back the backed up data to the location to leave the NVRAM as found 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	30100	The write-read test succeeded
	30101	The IIC bus could not be initialised
	30102	There was an NVRAM IO error
	30103	The value could not be read back from the NVRAM
Example	DS:> 301 030100: Test OK @	

Nucleus Name	DS_NVRAM_Clear	
Nucleus Number	302	
Description	Make the EEPROM empty, containing all zeroes.	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Create a memory block filled with zeroes - Write this block to the NVRAM 	
Execution Time	16 seconds	
User Input	None	
Error	Number	Description
	30200	The clearing of the NVRAM succeeded
	30201	There was an IIC error
	30202	Clearing the NVRAM failed
Example	DS:> 302 030200: Test OK @	

Nucleus Name	DS_NVRAM_Modify	
Nucleus Number	303	
Description	Modifies one or more locations in NVRAM and updates the checksum of the section modified	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Decode user input - Modify the NVRAM as indicated - Validate the NVRAM by calculating the checksum and storing it 	
Execution Time	Less than 1 second	
User Input	<ol style="list-style-type: none"> 1. The location that must be modified i.e. "ALL" "BOOT" "DIAGNOSTICS" "DOWNLOAD" "CONFIG" "RECORDER" or no string if an offset from the base address of the NVRAM is required 2. The offset and data which to put on the selected location <offset> <length> <data> 	
Error	Number	Description
	30300	Modifying the NVRAM contents succeeded
	30301	Unable to initialise NVM
	30302	Modifying the NVRAM contents failed
	30303	length out of range
	30304	unable to decode length
	30305	offset out of range
	30306	unable to decode offset
	30307	unknown location specified
	30308	no location is specified
	30309	number of values incorrect
	30310	There was an IIC error

Example	DS:> 303 DIAGNOSTICS 5 1 0x5a 030300: Section is modified successfully Test OK @
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Nucleus Name	DS_NVRAM_Read	
Nucleus Number	304	
Description	Read out one or more locations in the NVRAM	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Decode user input - Read from the NVRAM and return this info to the user 	
Execution Time	Less than 1 second	
User Input	1. The location which must be read i.e. "ALL" "BOOT" "DIAGNOSTICS" "DOWN LOAD" "CONFIG" "RECORDER" or no string if an offset from the base address of the NVRAM is required 2. The offset and number of bytes to read <offset> <length>	
Error	Number	Description
	30400	Value read
	30401	Unable to initialise NVM
	30402	Reading the NVRAM contents failed
	30403	length out of range
	30404	unable to decode length
	30405	offset out of range
	30406	unable to decode offset
	30407	unknown location specified
	30408	no location is specified
Example	304 DIAGNOSTICS 0 6 030400: Value read = 0x00 0x00 0x00 0x00 0x00 0x5A Test OK @	

SDRAM

Nucleus Name	DS_SDRAM_WriteRead	
Nucleus Number	400	
Description	Check all data lines, address lines and memory locations of the SDRAM	
Technical	<ul style="list-style-type: none"> - Test the databus - Test the address bus - Test the integrity of the device itself (memory locations) 	
Execution Time	11 seconds for 32 Mb 23 seconds for 64 Mb	
User Input	None	
Error	Number	Description
	40000	The write-read test succeeded
	40001	The data bus contains an error
	40002	The address bus contains an error
	40003	The SDRAM itself contains an error
Example	DS:> 400 040000: Test OK @	

Nucleus Name	DS_SDRAM_WriteReadFast	
Nucleus Number	401	
Description	Check all data lines and address lines of the SDRAM	
Technical	<ul style="list-style-type: none"> - Test the databus - Test the addressbus 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	40100	The write-read test succeeded
	40101	The data bus contains an error
	40102	The address bus contains an error
Example	DS:> 401 040100: Test OK @	

Nucleus Name	DS_SDRAM_Write	
Nucleus Number	402	
Description	Write to a specific memory address	
Technical	<ul style="list-style-type: none"> - Decode the user input and check its ranges and alignment on 4 bytes - Write the data to the SDRAM 	
Execution Time	Less than 1 second	
User Input	1. The location that must be modified (SDRAM starts at address 0xA0000000) 2. The value to put on the selected location	
Error	Number	Description
	40200	Writing to the SDRAM succeeded
	40201	Writing to the SDRAM failed; Wrong user input
	40202	Address is not dividable by 4
Example	DS:> 402 0xa1000010 0xad112222 040200: Test OK @	

Nucleus Name	DS_SDRAM_Read	
Nucleus Number	403	
Description	Read from a specific memory address	
Technical	<ul style="list-style-type: none"> - Decode the user input and check the ranges - Read from the SDRAM and return this info to the user 	
Execution Time	Less than 1 second	
User Input	The location from which the data must be read (SDRAM starts at address 0xA0000000)	
Error	Number	Description
	40300	Reading from the SDRAM succeeded
	40301	Reading from the SDRAM failed; Wrong user input
	40302	Address is not dividable by 4
Example	DS:> 403 0xa1000010 040300: Value read = 0xAD112222 Test OK @	

FLASH

Nucleus Name	DS_FLASH_DevTypeGet	
Nucleus Number	500	
Description	Get the device (revision) type information of the FLASH IC. (type, manufacturer, device ID and size)	
Technical	<ul style="list-style-type: none"> - Set the timing for the flash writing - Write a command sequence to determine device type information - Return the information to the user 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	50000	Getting the information from the FLASH succeeded
	50001	Getting the information from the FLASH failed
Example	DS:> 500 050000: Found FLASH memory: NOR AMD 29DL640G 8MB,NOR AMD 29DL640G 8MB Test OK @	

Nucleus Name	DS_FLASH_WriteRead	
Nucleus Number	501	
Description	Check whether the FLASH can be written to and read from	
Technical	<ul style="list-style-type: none"> - Find the test segment in flash - Read the data into SDRAM - Modify the data - Write this data from SDRAM to FLASH and verify it by reading back again 	
Execution Time	Less than 1 seconds.	
User Input	None	
Error	Number	Description
	50100	The FLASH write-read test succeeded
	50101	The test segment could not be found
	50102	All bits in the TEST region are filled with 0 (region exhausted)

	50103	The WriteRead test failed
	50104	The Write Failed
Example	DS:> 501 050100: Test OK @	

Nucleus Name	DS_FLASH_Read	
Nucleus Number	502	
Description	Read from a specific memory address in FLASH	
Technical	<ul style="list-style-type: none"> - Decode the user input and check the ranges and whether the address is aligned on 4 bytes - Read the data and return this to the user 	
Execution Time	Less than 1 seconds.	
User Input	The location from which data must be read (FLASH starts at address 0xB8000000)	
Error	Number	Description
	50200	Reading the FLASH succeeded
	50201	Reading the FLASH failed; Wrong user input
	50202	Address is not dividable by 4
Example	DS:> 502 0xb8000000 050200: Value read = 0x3C08A000 Test OK @	

Nucleus Name	DS_FLASH_ChecksumProgram	
Nucleus Number	503	
Description	Check the checksum of the application partitions by recalculating and comparing partition checksums	
Technical	<ul style="list-style-type: none"> - Determine the number of segments - Find the application in each segment and determine its checksum - Check whether the checksums stored match the newly calculated 	
Execution Time	6 seconds	
User Input	None	
Error	Number	Description
	50300	The checksum is valid, the test succeeded
	50301	The checksum is invalid
Example	DS:> 503 050300: BootCode checksum is: 0xBABE5B6F, which is correct Diagnostics checksum is : 0xBABEBAFF, which is correct Download checksum is: 0xBABEEDBF, which is correct Application checksum is : 0xBABE8EEC, which is correct Test OK @	

Nucleus Name	DS_FLASH_CalculateChecksum	
Nucleus Number	504	
Description	Calculate the checksum over all memory addresses. Used to check entire FLASH contents	
Technical	<ul style="list-style-type: none"> - Run the checksum calculation algorithm all flash memory addresses 	
Execution Time	6 seconds	
User Input	None	
Error	Number	Description
	50400	Calculating the checksum over all addresses succeeded
Example	DS:> 504 050400: The Checksum = 0xBABE30A4 Test OK @	

Nucleus Name	DS_FLASH_CalculateChecksumFast	
Nucleus Number	505	
Description	Calculate a checksum over a selected number of address locations	
Technical	<ul style="list-style-type: none"> - Run the checksum calculation algorithm on a selected number of flash memory addresses 	
Execution Time	6 seconds	
User Input	None	
Error	Number	Description
	50500	Calculating the checksum over selected addresses succeeded

Example	DS:> 505 050500: The Checksum = 0xBABEB064 Test OK @
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Video Input Processor (VIP)

Nucleus Name	DS_VIP_DevTypeGet	
Nucleus Number	600	
Description	Get the device (revision) type information of the VIP IC	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Read out the device (revision) type information of the VIP IC 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60000	Getting the information from the VIP succeeded
	60001	The IIC bus initialisation failed
	60002	There was an error getting the information from the VIP
	60003	Type not according to type stored in HW diversity string
Example	DS:> 600 060000: Found SAA7118 Test OK @	

Nucleus Name	DS_VIP_Communication	
Nucleus Number	601	
Description	Check the communication between the IIC controller of the Codec and the VIP IC	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Read data from a location in the VIP 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60100	Communicating with the VIP succeeded
	60101	The IIC bus was not accessible
	60102	There was a timeout reading the device
	60103	The IIC acknowledge was not received
	60104	The communication with the device failed
	60105	The IIC bus initialisation failed
Example	DS:> 601 060100: Test OK @	

Nucleus Name	DS_VIP_ClockOutputOn	
Nucleus Number	602	
Description	Switch the clock output on	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Set the clock output through IIC 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60200	Switching the clock output on succeeded
	60201	Switching the clock output on failed
Example	DS:> 602 060200: Test OK @	

Nucleus Name	DS_VIP_ClockOutputOff	
Nucleus Number	603	
Description	Switch the clock output off	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Reset the clock output through IIC 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60300	Switching the clock output off succeeded
	60301	Switching the clock output off failed

Example	DS:> 603 060300: Test OK @
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Nucleus Name	DS_VIP_SelectInput	
Nucleus Number	604	
Description	Select an input video path to be switched to the analogue output pin (AOUT) of the VIP	
Technical	<ul style="list-style-type: none"> - Check the user input - Initialise IIC - Read out the VIP id - Write the set of registers required for the input specified 	
Execution Time	Less than 1 second	
User Input	The input to select, see table below.	
Error	Number	Description
	60400	Selecting the input of the VIP succeeded
	60401	The user provided wrong input
	60402	The VIP was not accessible
	60402	An unsupported VIP was found
Example	DS:> 604 1 060400: Test OK @	

Table 5-1 Available channels for input of the 7118 and their description

Channel number	Description
1	CVBS_Y_IN_A
2	CVBS_OUT_B
3	CVBS_Y_IN_B
4	CVBS_Y_IN_C
6	C_IN
8	G_IN
9	Y_IN
13	B_IN
14	U_IN
18	R_IN
19	V_IN

Table 5-2 Available channels for input of the 7115 and their description

Channel number	Description
1	CVBS_Y_IN_B
2	CVBS_OUT_B_VIP
4	C_IN_VIP
7	CVBS_Y_IN_B

Digital Video Input Output (DVIO)

Nucleus Name	DS_DVIO_LinkDevTypeGet	
Nucleus Number	700	
Description	Get the device (revision) type information of the 1394 Link layer IC	
Technical	<ul style="list-style-type: none"> - Initialise the PIO pins on the Codec - Read out the ID register 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	70000	Getting the information from the link layer IC succeeded
	70001	Getting the information from the link layer IC failed
	70002	Type not according to type stored in HW diversity string
Example	DS:> 700 070000: Device type of the link layer IC: ffc00301 Test OK @	

Nucleus Name	DS_DVIO_PhyDevTypeGet	
Nucleus Number	701	

Description	Get the device (revision) type information of the 1394 Physical layer IC
Technical	<ul style="list-style-type: none"> - Initialise the PIO pins of the Codec-Write the PHY - access register in the Link chip to indicate phy read access - Wait until the link chip has obtained the value from the phy-chip - Read this out and filter the data to be returned to the user
Execution Time	Less than 1 second
User Input	None
Example	DS:> 701 070100: Physical layer IC: VendorID: 0x006037, ProductID: 0x412801 Test OK @

Nucleus Name	DS_DVIO_LinkCommunication	
Nucleus Number	702	
Description	Check the accessibility of the 1394 Link layer IC by writing to and reading from a specific address	
Technical	<ul style="list-style-type: none"> - Initialise the PIO pins of the chrysalis - Write a pattern to the CYCTM register of the link chip - Read back and verify the pattern 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	70200	Communicating with the link layer IC succeeded
	70201	Communicating with the link layer IC failed
	70202	Result of nucleus not according to HW diversity string
Example	DS:> 702 070200: Test OK @	

Nucleus Name	DS_DVIO_PhyCommunication	
Nucleus Number	703	
Description	Check the accessibility of the 1394 Physical layer IC by writing to and reading from a specific address	
Technical	<ul style="list-style-type: none"> - Initialise the PIO pins of the Codec - Initialise IIC - Write the data to be written to the phy-chip to the link chip first - Wait until the link chip indicates that the data has been written to the PHY - Write the PHY-access register in the Link chip to indicate PHY read access - Wait until the link chip has obtained the value from the PHY-chip - Test whether the value read back equals the one previously written 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	70300	Communicating with the physical layer IC succeeded
	70301	The physical layer IC was not accessible
	70302	Communicating with the physical layer IC failed
	70303	Result of nucleus not according to HW diversity string
Example	DS:> 703 070300: Test OK @	

Nucleus Name	DS_DVIO_Routing	
Nucleus Number	704	
Description	Route a DV stream containing an audio and video signal through the physical and link layer ICs to the Codec. This test works for both NTSC and PAL.	
Technical	<ul style="list-style-type: none"> - Initialise the DMA to transfer 5 frames PAL/NTSC - Initialise the DV demultiplexer - Initialise the 1394 interface and start reception of the DV stream - Check whether the stream was copied to memory properly by the byte input interface (port to memory type DMA) 	
Execution Time	6-10 seconds (6 when OK, 10 when no stream or error)	
User Input	None	

Error	Number	Description
	70400	Routing the signals succeeded
	70401	The 1394 link chip could not be initialised properly
	70402	There was a syntax error in the DV stream
	70403	DMA could not copy DV stream to memory. Stream connected?
	70404	DMA not working properly
Example	DS:> 704 070400: Test OK @	

Nucleus Name	DS_DVIO_DetectNode	
Nucleus Number	705	
Description	Check whether a DV node can be detected by the hardware. This test works for both NTSC and PAL.	
Technical	<ul style="list-style-type: none"> - Initialise the 1394 interface - Detect whether a node is in range 	
Execution Time	3 or 5 seconds (3 when OK, 5 when no stream or error)	
User Input	None	
Error	Number	Description
	70500	The node was detected OK
	70501	The 1394 link chip could not be initialised properly
	70502	Unable to write to 1394 PHY chip
	70503	Unable to read from 1394 PHY chip
	70504	No node was detected
Example	DS:> 705 070500: Test OK @	

Nucleus Name	DS_DVIO_DetectStream	
Nucleus Number	706	
Description	Check whether a DV stream can be detected by the hardware. This test works for both NTSC and PAL.	
Technical	<ul style="list-style-type: none"> - Initialise the 1394 interface - Start receiving the stream - Detect whether the stream is OK 	
Execution Time	3 or 5 seconds (3 when OK, 5 when no stream or error)	
User Input	None	
Error	Number	Description
	70600	The stream was detected
	70601	The 1394 link chip could not be initialised properly
	70602	No stream detected
Example	DS:> 706 070600: Test OK @	

Progressive Scan (PSCAN)

Nucleus Name	DS_PSCAN_DencDevTypeGet	
Nucleus Number	800	
Description	Retrieve the device type information from the progressive scan DENC IC	
Technical	-	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	80000	Retrieving the device type information succeeded
	80001	The IIC bus was not accessible
	80002	There was a timeout reading the device
	80003	The IIC acknowledge was not received
	80004	Communicating with the progressive scan DENC-IC failed
	80005	The initialisation of the IIC bus failed
Example	DS:> 800 080000: Device Type xxxx t.b.d. Test OK @	

Nucleus Name	DS_PSCAN_CommunicationDenc	
Nucleus Number	801	
Description	Check the communication between the IIC controller of the chrysalis and the progressive scan DENC-IC	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Write data to a register of the DENC through IIC 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	80100	Communicating with the progressive scan DENC-IC succeeded
	80101	The IIC bus was not accessible
	80102	There was a timeout reading the device
	80103	The IIC acknowledge was not received
	80104	Communicating with the progressive scan DENC-IC failed
	80105	The initialisation of the IIC bus failed
	80106	The read data is not the same as the written data
	80107	No chip was expected
Example	DS:> 801 080100: Test OK @	

Nucleus Name	DS_PSCAN_TestImageOn	
Nucleus Number	802	
Description	Generate the test images that are present on the progressive scan IC.	
Technical	<ul style="list-style-type: none"> - Determine whether the user wanted a HATCH or a FRAME image pattern - Initialise the PIO pins of the Codec - Initialise IIC - Reset the DENC - Enable the 27Mhz clock - Send all settings for the pattern to the DENC through IIC 	
Execution Time	Less than 1 second	
User Input	In case of ADV7196: When no input is given "HATCH" is the default -"HATCH" -"FRAME" Remark: "HATCH" is a crosshatch test pattern (horizontal and vertical white lines are displayed against a black background) "FRAME" is a uniform coloured frame/field test pattern (default white). In case of FLI2300: Nothing.	
Error	Number	Description
	80200	The generation of the test image succeeded
	80201	Unable to initialise PSCAN IC
	80202	Unable to reset DENC
	80203	Unable to generate image
	80204	No chip was expected
Example	DS:> 802 HATCH 080200: Test OK @	

Nucleus Name	DS_PSCAN_TestImageOff	
Nucleus Number	803	
Description	Switch off the generated test image	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Send the default DENC settings to the DENC through IIC 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	80300	Turning off the test image succeeded
	80301	Unable to initialise PSCAN IC
	80302	IIC Error during writing PSCAN IC
	80303	No chip was expected

Example	DS:> 803 080300: Test OK @
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Nucleus Name	DS_PSCAN_TestImageColourSettingsSet	
Nucleus Number	804	
Description	Set the colour of the hatch- or the frame- field to a different value than the default white	
Technical	<ul style="list-style-type: none"> - Determine which colour must be set. - Initialise IIC. - Enable 27 Mhz PSCAN Clock. - Send all settings to the DENC through IIC. 	
Execution Time	Less than 1 second.	
User Input	A colour string of one of the next non-case sensitive strings (WHITE, BLACK, RED, GREEN, BLUE, YELLOW, CYAN, MAGENTA) or Y Cr Cb (hexa-) decimal values.	
Error	Number	Description
	80400	Setting the new colour-settings succeeded
	80401	The user provided wrong input
	80402	Unable to initialise pscan ic
	80403	Unable to set colour
	80404	No chip was expected
Example	DS:> 804 yellow 080400: Test OK @ DS:> 804 0x6a 0xde 0xca 080400: Test OK @	

Nucleus Name	DS_PSCAN_TestImageColourSettingsGet	
Nucleus Number	805	
Description	Get the colour settings of the hatch- or the frame- field.	
Technical	<ul style="list-style-type: none"> - Initialise IIC. - Read the colour settings from the DENC through IIC. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	80500	Getting the colour-settings succeeded
	80501	The progressive scan DENC-IC was not accessible through IIC
	80502	Unable to get colour
	80503	No chip was expected
Example	DS:> 805 080500: Colour Y Cr Cb values: 0xD2 0x92 0x10 Test OK @	

Nucleus Name	DS_PSCAN_Routing	
Nucleus Number	806	
Description	Route a video signal from the codec host processor through the progressive scan ICs to the progressive scan output of the set. Note: To route the progressive scan to the output of the set, first call the nucleus to do the video routing on the analogue (part of the) board.	
Technical	<ul style="list-style-type: none"> - Initialise the PIO pins of the Codec - Initialise IIC - Reset the DENC - Enable the 27Mhz clock - Send all settings to the DENC through IIC. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	80600	Routing path is created successfully.
	80601	Unable to initialise the Codec.
	80602	Unable to access DENC
	80603	Unable to access de-interlacer.
	80604	Wrong chips were expected.
Example	DS:> 806 080600: Test OK @	

Nucleus Name	DS_PSCAN_DevTypeGetDeinterlacer	
Nucleus Number	807	
Description	Get the device (revision) type information of the progressive scan de-interlacer.	
Technical	<ul style="list-style-type: none"> - Initialise the de-interlacer. - Read the version register of the de-interlacer. 	
Execution Time	1 second	
User Input	None	
Error	Number	Description
	80700	Everything went well.
	80701	The communication with the device failed
	80702	No chip was expected
Example	DS:> 807 080700: Chip name : 2300 Chip version : 1 Test OK @	

Nucleus Name	DS_PSCAN_CommunicationDeinterlacer	
Nucleus Number	808	
Description	Check the communication between the IIC controller of the Codec and the progressive scan De-interlacer-IC	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Set the video source synchronisation source to the Codec - Write data to the DENC through IIC 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	80800	Communicating with the progressive scan De-interlacer-IC succeeded
	80801	The IIC bus was not accessible
	80802	There was a timeout reading the device
	80803	The communication with the device failed (no ACK)
	80804	Communicating with the progressive scan De-interlacer-IC failed
	80805	The initialisation of the IIC bus failed
	80806	The data read back is not the same as the data written
	80807	No chip was expected
Example	DS:> 808 080800: Test OK @	

Basic Engine (BE)

Nucleus Name	DS_BE_CommunicationEcho	
Nucleus Number	900	
Description	Check the communication between the digital board and the basic engine by issuing an <i>echo</i> command	
Technical	<ul style="list-style-type: none"> - Send the ECHO command - Check if the BE returned the string 0x00 0xAA 0x55 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	90000	Communicating with the BE over the S2B interface succeeded
	90001	There was a time-out while communicating
	90002	The Basic Engine returned an unexpected result
	90003	The Basic Engine returned an error code
	90004	No acknowledge received from BE
	90005	Communicating with the Basic Engine failed
	90006	Echo check failed, no echo received
	90007	Echo check failed, received wrong pattern
Example	DS:> 900 090000: Test OK @	

Nucleus Name	DS_BE_Reset	
Nucleus Number	901	
Description	Reset the basic engine	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Toggle the reset pin of the I2S interface - In case of an AV3 Toggle the reset pin of the IDE interface 	
Execution Time	2 seconds on AV2 9 seconds on AV3 (when disc inside)	
User Input	None	
Error	Number	Description
	90100	Resetting the Basic Engine succeeded
	90101	Resetting the Basic Engine failed
Example	DS:> 901 090100: Test OK @	

Nucleus Name	DS_BE_GetSelftestResult	
Nucleus Number	902	
Description	Return the self-test results through the service port	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Send the S2B GET_SELF_TEST_RESULT command - In case of an AV3 Send the ATAPI REPORT_DRIVE_DIAGNOSTICS command - On error display the specific error codes received from the BE 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	90200	Self test succeeded, no errors
	90201	There was a time-out while communicating
	90202	The Basic Engine returned an unexpected result
	90203	The BE returned an error code
	90204	No acknowledge received from BE
	90205	Communicating with the Basic Engine failed
	90206	Basic Engine returned no info
	90207	Self test failed, errors are echoed
Example	DS:> 902 090200: Self-test result byte : 00000000 Self-test result byte : 00000000 Self-test result byte : 00000000 Test OK @	

Nucleus Name	DS_BE_VersionGet	
Nucleus Number	903	
Description	Get the version of the basic engine and that of the optical unit	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 send the S2B GET_VERSION_NUMBER command - In case of an AV3 send the ATAPI INQUIRY command - Send the GET_OPU_VERSION command - Display the returned version information 	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	90300	BE version OK
	90301	There was a time-out while communicating
	90302	The Basic Engine returned an unexpected result
	90303	The BE returned an error code
	90304	No acknowledge received from BE
	90305	Communicating with the Basic Engine failed
	90306	The BE returned no info
Example	DS:> 903 090300: BE version = 31.30.24. PHILIPS ,VAD8031 ,31302400,REL_8031_313024 2073, Optical unit version = 00.06.82.19.00 Test OK @	

Nucleus Name	DS_BE_TrayOut	
Nucleus Number	904	
Description	Open the tray of the basic engine	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Send the S2B TRAY_OUT command - In case of an AV3 send an ATAPI START_STOP_UNIT command 	
Execution Time	Approximately 2 seconds	
User Input	None	
Error	Number	Description
	90400	The command executed successfully
	90401	There was a time-out while communicating
	90402	The Basic Engine returned an unexpected result
	90403	The BE returned an error code
	90404	No acknowledge received from BE
	90405	Unable to enter normal mode
	90406	Communicating with the Basic Engine failed
Example	DS:> 904 090400: Test OK @	

Nucleus Name	DS_BE_TrayIn	
Nucleus Number	905	
Description	Close the tray of the basic engine	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - Send the S2B TRAY_IN command - In case of an AV3 send an ATAPI START_STOP_UNIT command 	
Execution Time	Approximately 1 - 2 seconds	
User Input	None	
Error	Number	Description
	90500	The command executed successfully
	90501	There was a time-out while communicating
	90502	The Basic Engine returned an unexpected result
	90503	The BE returned an error code
	90504	No acknowledge received from BE
	90505	Unable to enter normal mode
	90506	Communicating with the Basic Engine failed
Example	DS:> 905 090500: Test OK @	

Nucleus Name	DS_BE_WriteReadDvdRw	
Nucleus Number	906	
Description	Write data to and read data from a DVD+RW disc through the basic engine for verification of the writing	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - Execute DS_BE_GetSelftestResults - Send the TRAY_IN command - Send the READ_TOC command - Generate a random disc location - Generate test data to write to the DVD+RW - In case of an AV2 Transfer the test data to the disc location using DMA - In case of an AV3 Transfer the test data to the disc location using PIO mode ATAPI WRITE_10 - In case of an AV2 Read back the data from disc using DMA - In case of an AV3 Transfer the test data to the disc location using PIO mode ATAPI READ_10 - Compare the two data areas and check whether the areas are equal 	
Execution Time	Approximately 20 seconds	
User Input	None	

Error	Number	Description
	90600	The command executed successfully
	90601	This nucleus cannot be executed because the Self-Test failed
	90602	The BE cannot enter normal operating mode
	90603	Unable to send the tray in
	90604	Unable to read TOC from disc
	90605	Invalid disc is loaded, please insert a DVD+RW disc
	90606	Writing the test pattern to DVD+RW failed
	90607	Reading back the test pattern from DVD+RW failed
	90608	Compare check failed
	90609	Calibrating DVD+RW failed
Example	DS:> 906 090600: Testing on sector 0x5dbe0: OK Test OK @	

Nucleus Name	DS_BE_WriteReadDvdR	
Nucleus Number	907	
Description	Write data to and read data from a DVD+R disc through the basic engine for verification of the writing	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - Execute DS_BE_GetSelftestResults - Send the TRAY_IN command - Send the READ_TOC command - Use the OPC area to test if the DVD+R is (still) writable - Generate test data to write to the DVD+R - In case of an AV2 Transfer the test data to the disc location using DMA - In case of an AV3 Transfer the test data to the disc location using PIO mode ATAPI WRITE_10 - In case of an AV2 Read back the data from disc using DMA - In case of an AV3 Transfer the test data to the disc location using PIO mode ATAPI READ_10 - Compare the two data areas and check whether the areas are equal 	
Execution Time	Approximately 20 seconds	
User Input	None	
Error	Number	Description
	90700	The command executed successfully
	90701	This nucleus cannot be executed because the Self-Test failed
	90702	The BE cannot enter normal operating mode
	90703	Unable to send the tray in
	90704	Unable to read TOC from disc
	90705	Invalid disc is loaded, please insert a DVD+RW disc
	90706	Unable to write, the DVD+R disc is full
	90707	No writable DVD+R sector found
	90708	Writing the test pattern to DVD failed
	90709	Reading back the test pattern from DVD failed
	90710	Compare check failed
Example	DS:> 907 090700: Testing on sector 0x36210: OK Test OK @	

Nucleus Name	DS_BE_StatisticalInformationGet	
Nucleus Number	908	
Description	Retrieve the statistical information from the basic engine	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Send the S2B GET_STATISTICAL_INFO command - In case of an AV3 Send the transparent BIT engine GET_STATISTICAL_INFO command - Display the info returned from the BE 	
Execution Time	Less than 1 second on AV2 2 seconds on AV3	
User Input	None	

Error	Number	Description
	90800	The command executed successfully
	90801	There was a time-out while communicating
	90802	The Basic Engine returned an unexpected result
	90803	The BE returned an error code
	90804	No acknowledge received from BE
	90805	Communicating with the Basic Engine failed
	90806	The BE returned no info
Example (AV2)	DS:> 908 Number of times Tray went Open/Closed : 4 Total minutes the CD laser was on : 0 Total minutes the DVD laser was on : 0 Total minutes the write laser was on : 0 090800: Test OK @	
Example (AV3)	DS:> 908 Number of times Tray went Open/Closed 4 Total time the power power on (HR:MIN) 0:0h Total time of reading CDROM discs (HR:MIN) 0:0h Total time of reading high speed CD-R discs (HR:MIN) 0:0h Total time of reading other CD-R discs (HR:MIN) 0:0h Total time of reading high speed CD-RW discs (HR:MIN) 0:0h Total time of reading other CD-RW discs (HR:MIN) 0:0h Total time of reading high speed DVD SL discs (HR:MIN) 0:0h Total time of reading other DVD SL discs (HR:MIN) 0:0h Total time of reading high speed DVD DL discs (HR:MIN) 0:0h Total time of reading other DVD DL discs (HR:MIN) 0:0h Total time of reading high speed DVD+R discs (HR:MIN) 0:0h Total time of reading other DVD+R discs (HR:MIN) 0:2h Total time of reading high speed DVD+RW discs (HR:MIN) 0:0h Total time of reading other DVD+RW discs (HR:MIN) 0:35h Total time of writing DVD+R discs at 2.4 x (HR:MIN) 0:0h Total time of writing DVD+R discs at 4 x (HR:MIN) 0:0h Total time of writing DVD+RW discs at 2.4 x (HR:MIN) 0:0h Total time of writing DVD+RW discs at 4 x (HR:MIN) 0:0h 090800: Test OK @	

Nucleus Name	DS_BE_StatisticalInformationReSet	
Nucleus Number	909	
Description	Reset the statistical information in the basic engine	
Technical	<ul style="list-style-type: none"> - Send the RESET_STATISTICAL_INFO command - Send the POWER_DOWN command - Toggle the reset pin of the I2S interface 	
Execution Time	2 seconds	
User Input	None	
Error	Number	Description
	90900	The command executed successfully
	90901	There was a time-out while communicating
	90902	The Basic Engine returned an unexpected result
	90903	The BE returned an error code
	90904	No acknowledge received from BE
	90905	Communicating with the Basic Engine failed
Example	DS:> 909 090900: Test OK @	

Nucleus Name	DS_BE_ErrorLogGet	
Nucleus Number	910	
Description	Get the error log from the basic engine	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Send the S2B GET_ERROR command - In case of an AV3 Send the transparent BIT engine GET_ERROR and GET_FATAL commands - Display the returned info 	
Execution Time	Less than 1 second	
User Input	None	

Error	Number	Description
	91000	The command executed successfully
	91001	There was a time-out while communicating
	91002	The Basic Engine returned an unexpected result
	91003	The BE returned an error code
	91004	No acknowledge received from BE
	91005	Communicating with the Basic Engine failed
	91006	The BE returned no info
Example (AV2)	DS:> 910 Momentary errors (Byte 1 - Byte 7) : 0x00 0x00 0x00 0x00 0x00 0x00 0x00 Cumulative errors (Byte 1 - Byte 7) : 0x00 0x00 0x00 0x20 0x00 0x00 0x00 Fatal errors (Oldest - Youngest) : 0x00 0x00 0x00 0x00 0x00 091000: Test OK @	
Example (AV3)	DS:> 910 Momentary errors (0-9): 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 Cumulative errors (1-9) : 0x00 0x80 0x20 0x00 0x00 0x00 0x00 0x00 0x00 0x00 Software fatal assert : 799 engineproxy.cpp 091000: Test OK @	

Nucleus Name	DS_BE_ErrorLogReset	
Nucleus Number	911	
Description	Reset the error log in the basic engine	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 <ul style="list-style-type: none"> - Send the S2B RESET_STATISTICAL_INFO command - Send the S2B POWER_DOWN command - Toggle the reset pin of the I2S interface - In case of an AV3 Send the transparent BIT engine RESET_STATISTICAL_INFO command 	
Execution Time	2 seconds	
User Input	None	
Error	Number	Description
	91100	The command executed successfully
	91101	There was a time-out while communicating
	91102	The Basic Engine returned an unexpected result
	91103	The BE returned an error code
	91104	No acknowledge received from BE
	91105	Communicating with the Basic Engine failed
Example	DS:> 911 091100: Test OK @	

Nucleus Name	DS_BE_JitterOptimise	
Nucleus Number	912	
Description	Perform jitter optimisation: A formatted DVD must be loaded into the engine before executing this nucleus	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - Send the TRAY_IN command - Send the READ_TOC command - In case of an AV2 <ul style="list-style-type: none"> - Send the JITTER_COMMAND command with parameter 0x00 0x00 - Send the JITTER_COMMAND command with parameter 0x00 0x01 - Send the JITTER_COMMAND command with parameter 0x00 0x02 until offset 0x80 is received - In case of an AV3 Send the MEASURE_JITTER_BLER_PPN command and display the average jitter and bler values 	
Execution Time	Approximately 20 seconds	
User Input	none	

Error	Number	Description
	91200	Optimising jitter succeeded
	91201	There was a time-out while communicating
	91202	The Basic Engine returned an unexpected result
	91203	The Basic Engine returned an error code
	91204	No acknowledge received from BE
	91205	Unable to send tray in
	91206	Unable to read the disc
	91207	No disc is loaded
	91208	Unknown disc is loaded
	91209	Unable to enter service mode
Example (AV2)	DS:> 912 091200: Jitter bathtub: (-42,135)(-40,127)(-38,106)(-36,106)(-34,101)(-32,97)(-30,92)(-28,92)(-26,92)(-24,92)(-22,86)(-20,80)(-18,86)(-16,86)(-14,80)(-12,80)(-10,80)(-8,80)(-6,80)(-4,86)(-2,86)(0,86)(2,86)(4,92)(6,92)(8,101)(10,106)(12,111)(14,120)(16,123)(18,127)(20,142) Test OK @	
Example (AV3)	DS:> 912 091200: Average Jitter, Bler C1, Bler C2: (92,4,254) Test OK @	

Nucleus Name	DS_BE_FocusOn	
Nucleus Number	913	
Description	Put the laser of the BE into focus	
Technical	- Check if an AV2 or AV3 is connected - In case of an AV2 Send the FOCUS command with parameter 0x01 - In case of an AV3 Send the transparent BIT engine FOCUS command	
Execution Time	3 seconds	
User Input	None	
Error	Number	Description
	91300	Focus on succeeded
	91301	There was a time-out while communicating
	91302	The Basic Engine returned an unexpected result
	91303	The BE returned an error code
	91304	No acknowledge received from BE
	91305	Communicating with the Basic Engine failed
	91306	Unable to enter service mode
Example	DS:> 913 091300: Test OK @	

Nucleus Name	DS_BE_FocusOff	
Nucleus Number	914	
Description	Turn off putting the laser of the BE into focus	
Technical	- Check if an AV2 or AV3 is connected - In case of an AV2 Send the FOCUS command with parameter 0x00 - In case of an AV3 Send the transparent BIT engine FOCUS command	
Execution Time	Less than 1 second on AV2 2 seconds on AV3	
User Input	None	
Error	Number	Description
	91400	Focus off succeeded
	91401	There was a time-out while communicating
	91402	The Basic Engine returned an unexpected result
	91403	The BE returned an error code
	91404	No acknowledge received from BE
	91405	Communicating with the Basic Engine failed
	91406	Unable to enter service mode
Example	DS:> 914 091400: Test OK @	

Nucleus Name	DS_BE_MotorOn	
Nucleus Number	915	

Example(AV2)	DS:> 920 092000: Tilt sensor bathtub: (71,-12,145)(68,-12,135)(62,-10,120)(56,-92,97)(50,-75,86) (44,-59,80)(41,-52,80)(35,-37,86)(29,-22,86) (23,-7,92)(17,8,111)(11,23,135)(8,31,138)(5,39,158) Test OK @
Example (AV3)	DS:> 920 092010: Tilt function is not supported by the engine Error @

Nucleus Name	DS_BE_CheckDisc	
Nucleus Number	921	
Description	Check whether there is a disc inside the BE	
Technical	<ul style="list-style-type: none"> - Send the TRAY_IN command - Send the READ_TOC command - Display the Disc type info - If Disc type is a DVD+R(W), then read ADIP info. - Display manufacturer and media type. 	
Execution Time	Approximately 10 seconds	
User Input	None	
Error	Number	Description
	92100	There was a disc inside the set
	92101	Unable to load the tray
	92102	Error received from BE
Example	<p>DS:> 921 092100: Disc type: DVD+RW disc Disc manufacturer id: PHILIPS Media type id: 010 Test OK @</p> <p>DS:> 921 090500: Disc type: None Test OK @</p> <p>DS:> 921 092100: Disc type: DVD+R disc Disc manufacturer id: RICOHJPN Media type id: R00 Test OK @</p>	

Nucleus Name	DS_BE_SledgeMotor	
Nucleus Number	922	
Description	Send the sledge to its home position, then to the middle of the disc, and then to the end.	
Technical	<ul style="list-style-type: none"> - Send the PCS_COMMAND command with parameter 0x03 0x00 - Send the PCS_COMMAND command with parameter 0x02 0x00 - Send the PCS_COMMAND command with parameter 0x00 0x01 - Send the PCS_JUMP_SLEGE_STEPS command for 3 times - Send the PCS_COMMAND command with parameter 0x00 0x00 	
Execution Time	4 seconds on AV2 11 seconds on AV3	
User Input	None	
Error	Number	Description
	92200	The command executed successfully
	92201	There was a time-out while communicating
	92202	The Basic Engine returned an unexpected result
	92203	The BE returned an error code
	92204	No acknowledge received from BE
	92205	Communicating with the Basic Engine failed
	92206	Unable to enter service mode
Example	<p>DS:> 922 092200: Test OK @</p>	

Description	Turn on the turntable motor	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Send the TURN_TABLE_MOTOR_ON command - In case of an AV3 Send the transparent BIT engine TTM command 	
Execution Time	Less than 1 second on AV2 4 seconds on AV3	
User Input	None	
Error	Number	Description
	91500	Turn table motor is on
	91501	There was a time-out while communicating
	91502	The Basic Engine returned an unexpected result
	91503	The BE returned an error code
	91504	No acknowledge received from BE
	91505	Communicating with the Basic Engine failed
	91506	Unable to enter service mode
Example	DS:> 915 091500: Test OK @	

Nucleus Name	DS_BE_MotorOff	
Nucleus Number	916	
Description	Turn off the turntable motor	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 Send the TURN_TABLE_MOTOR_ON command - In case of an AV3 Send the transparent BIT engine TTM command 	
Execution Time	Less than 1 second on AV2 4 seconds on AV3	
User Input	None	
Error	Number	Description
	91600	Turn table motor is off
	91601	There was a time-out while communicating
	91602	The Basic Engine returned an unexpected result
	91603	The BE returned an error code
	91604	No acknowledge received from BE
	91605	Communicating with the Basic Engine failed
	91606	Unable to enter service mode
Example	DS:> 916 091600: Test OK @	

Nucleus Name	DS_BE_Tilt	
Nucleus Number	920	
Description	Test the tilt mechanism control loop, or allow its proper functioning to be measured. Before executing this nucleus a disc must be loaded in the recorder	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 <ul style="list-style-type: none"> - Send the TRAY_IN command - Send the READ_TOC command - Send the TILT_COMMAND command with parameter 0x00 0x00 - Send the TILT_COMMAND command with parameter 0x00 0x02 - In case of an AV3 display a "not supported" message 	
Execution Time	Approximately 15 seconds	
User Input	None	
Error	Number	Description
	92000	The command executed successfully
	92001	There was a time-out while communicating
	92002	The Basic Engine returned an unexpected result
	92003	The Basic Engine returned an error code
	92004	No acknowledge received from BE
	92005	Unable to send tray in
	92006	Unable to read the disc
	92007	No disc is loaded
	92008	Unknown disc is loaded
	92009	Unable to enter service mode
	92010	This nucleus is not supported by the engine

Nucleus Name	DS_BE_ReadTocInfo	
Nucleus Number	924	
Description	Read the TOC from the disc. This gives a good indication if the BE works properly.	
Technical	<ul style="list-style-type: none"> - Send the TRAY_IN command - Send the READ_TOC command - Display the TOC info. 	
Execution Time	Approximately 10 seconds	
User Input	None	
Error	Number	Description
	92400	A disc is loaded, TOC info if echoed
	92401	Unable to load the tray
	92402	The BE has not returned TOC info
	92403	Error received from BE
Example	<p>DS:> 924 092400: TOC info [hex] = 91 3A 0C Test OK @</p> <p>DS:> 924 092403: The BE returned: 0x10 #{no_disc_error} No disc is detected Error @</p> <p>DS:> 924 092403: The BE returned: 0x1e #{illegal_medium_error} Engine unable to handle current disc. Probably illegal medium. Error @</p>	

Nucleus Name	DS_BE_DiscErase	
Nucleus Number	925	
Description	Perform a DC-erase on a DVD+RW disc.	
Technical	<ul style="list-style-type: none"> -Check if an AV2 or AV3 is connected -In case of an AV2 -Execute DS_BE_GetSelftestResults -Send the TRAY_IN command -Send the READ_TOC command -Send the SET_INPUT_TYPE command with parameter DC_ERASE -Overwrite the header of the DVD+RW disc with DC erase data -Send the SET_INPUT_TYPE command with parameter NORMAL. -In case of an AV3 display a "not supported" message 	
Execution Time	Approximately 1:15 minute	
User Input	None	
Error	Number	Description
	92500	A DVD+RW disc is erased
	92501	This nucleus cannot be executed because the Self-Test failed
	92502	The BE cannot enter normal operating mode
	92503	Unable to send the tray in
	92504	Unable to read TOC from disc
	92505	Invalid disc is loaded, please insert a DVD+RW disc
	92506	Calibrating DVD+RW failed
	92507	Set Input Type command failed
	92508	Erasing the DVD+RW disc failed
	92509	Erasing is aborted by user
	92510	This nucleus is not supported by the engine
Example (AV2)	<p>DS:> 925 The entirely disc will be erased. Are you sure you want this?[y/n]</p> <p>092500: Test OK @</p>	
Example (AV3)	<p>092510: This nucleus is not supported by the engine Error @</p>	

Nucleus Name	DS_BE_RegionCodeSet	
Nucleus Number	928	
Description	Set the region code in the AV3.	

Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 display a "not supported" message - In case of an AV3 send the ATAPI SEND_KEY command 	
Execution Time		
User Input	Region code	
Error	Number	Description
	92800	The command executed successfully
	92801	There was a time-out while communicating
	92802	The Basic Engine returned an unexpected result
	92803	The BE returned an error code
	92804	No acknowledge received from BE
	92805	Communicating with the Basic Engine failed
	92806	No disc is present, please insert disc
	92807	Region code out of range
	92808	User input wrong
	92809	Region counter expired
	92810	This nucleus is not supported by the engine
Example (AV2)	DS:> 928 092810: This nucleus is not supported by the engine Error @	
Example (AV3)	DS:> 928 1 092800: Test OK @	

Nucleus Name	DS_BE_RegionCodeGet	
Nucleus Number	929	
Description	Read the region code from the AV3.	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 display a "not supported" message - In case of an AV3 send the ATAPI REPORT_KEY command 	
Execution Time		
User Input	None	
Error	Number	Description
	92900	The command executed successfully
	92901	There was a time-out while communicating
	92902	The Basic Engine returned an unexpected result
	92903	The BE returned an error code
	92904	No acknowledge received from BE
	92905	Communicating with the Basic Engine failed
	92906	This nucleus is not supported by the engine
Example (AV2)	DS:> 929 092906: This nucleus is not supported by the engine Error @	
Example (AV3)	DS:> 929 092900: DVD region 1 Test OK @	

Nucleus Name	DS_BE_RegionCounterReset	
Nucleus Number	930	
Description	Reset the region counter in the AV3.	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 display a "not supported" message - In case of an AV3 send a special ATAPI RESET_REGION_COUNTER command 	
Execution Time		
User Input	None	
Error	Number	Description
	93000	The command executed successfully
	93001	There was a time-out while communicating
	93002	The Basic Engine returned an unexpected result
	93003	The BE returned an error code
	93004	No acknowledge received from BE
	93005	Communicating with the Basic Engine failed
	93006	This nucleus is not supported by the engine

Example (AV2)	DS:> 930 093006: This nucleus is not supported by the engine Error @
Example (AV3)	DS:> 930 093000: Test OK @

Nucleus Name	DS_BE_AdjustLaserControl	
Nucleus Number	931	
Description	Adjust the DVD-M (with the OPU) with PCBA. (So adjusts the two PCBS to each other)	
Technical	<ul style="list-style-type: none"> - Check if an AV2 or AV3 is connected - In case of an AV2 display a "not supported" message - In case of an AV3 adjust the DVD-M (with the OPU) with PCBA by sending a S2B command to align the PCBs to each other. 	
Execution Time	30 seconds	
User Input	None	
Error	Number	Description
	93100	The command executed successfully
	93101	There was a time-out while communicating
	93102	The Basic Engine returned an unexpected result
	93103	The BE returned an error code
	93104	No acknowledge received from BE
	93105	Communicating with the Basic Engine failed
	93106	Unable to enter service mode
	93107	This nucleus is not supported by the engine
Example (AV2)	DS:> 931 093107: This nucleus is not supported by the engine Error @	
Example (AV3)	DS:> 931 093100: Test OK @	

System (SYS)

Nucleus Name	DS_SYS_HardwareVersionGet	
Nucleus Number	1200	
Description	Get the hardware version and type of the digital board	
Technical	Initialise the PIO pins of the Codec Read the segment header in FLASH and determine hardware version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120000	Getting the hardware version and type of the digital board succeeded
	120001	Getting the hardware version and type of the digital board failed
	120002	Wrong hardware version read from FLASH
Example	DS:> 1200 120000: Hardware ID = 0x29 Test OK @	

Nucleus Name	DS_SYS_SoftwareVersionBootGet	
Nucleus Number	1201	
Description	Get the version of the boot software on the digital board	
Technical	Read the segment header in FLASH and determine Boot software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120100	Getting the Boot software version succeeded
	120101	Getting the Boot software version failed
Example	DS:> 1201 120100: Software Boot Version = 0331 Test OK @	

Nucleus Name	DS_SYS_SoftwareVersionDownloadGet	
Nucleus Number	1202	
Description	Get the version of the download software on the digital board	
Technical	Read the segment header in FLASH and determine Download software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120200	Getting the Download software version succeeded
	120201	Getting the Download software version failed
Example	DS:> 1202 120200: Software Download Version = 0001 Test OK @	

Nucleus Name	DS_SYS_SoftwareVersionApplGet	
Nucleus Number	1203	
Description	Get the version of the application software on the digital board	
Technical	Read the segment header in FLASH and determine Application software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120300	Getting the Application software version succeeded
	120301	Getting the Application software version failed
Example	DS:> 1203 120300: Software Application Version = 0001 Test OK @	

Nucleus Name	DS_SYS_SoftwareVersionDiagnosticsGet	
Nucleus Number	1204	
Description	Get the version of the diagnostics software on the digital board	
Technical	Read the segment header in FLASH and determine Diagnostics software version	
Execution Time	Less than 1 second	
User Input	None	

Error	Number	Description
	120400	Getting the Diagnostics software version succeeded
	120401	Getting the Diagnostics software version failed
Example	DS:> 1204 120400: Software Diagnostics Version = 0001 Test OK @	

Nucleus Name	DS_SYS_EepromUpload	
Nucleus Number	1205	
Description	Upload the contents of the NVRAM on the analogue board or the digital board to the service PC, by using the X-modem protocol	
Technical	<ul style="list-style-type: none"> - Decode the user input - Determine whether to upload the analogue board or digital board NVRAM - Start uploading using the XMODEM protocol - Determine whether all was uploaded OK 	
Execution Time	Depends on the chosen NVRAM and the User.	
User Input	Choose one of the following parameters for the nucleus: 1. Upload the contents of the NVRAM of the digital board 2. Upload the contents of the NVRAM of the analogue board Choose in the terminal on the control PC -> transfer -> receive file . Select X-modem protocol. Then click receive in the dialogue and fill in the file name in which you want to store the data.	
Error	Number	Description
	120500	Download succeeded.
	120501	User input is not valid.
	120502	Something went wrong while copying the data from NVRAM to SDRAM .
	120503	Something went wrong while transferring the data.
	120504	User cancelled the upload.
Example	DS:> 1205 1 120500: Test OK @	

Nucleus Name	DS_SYS_EepromDownload	
Nucleus Number	1206	
Description	Download a file with the contents of the NVRAM for the analogue board or the digital board from the service PC to the recorder, by using the X-modem protocol	
Technical	<ul style="list-style-type: none"> - Decode the user input and determine what EEPROM to fill: digital / analogue - Store the downloaded (using XMODEM) bytes in SDRAM first - Then copy these contents into the EEPROM after verification 	
Execution Time	Depends on the chosen NVRAM and the User.	
User Input	Choose one of the following parameters for the nucleus: 1. Download the contents of the NVRAM of the digital board 2. Download the contents of the NVRAM of the analogue board Choose in the terminal of the control PC -> transfer -> send file . Select X-modem protocol. Then choose a file with the Browse button in the dialogue and click on send .	
Error	Number	Description
	120600	Download succeeded
	120601	The write to NVRAM failed.
	120602	Timeout. Too many retries.
	120603	A file was sent with a wrong header.
	120604	User cancelled the download.
	120605	User input is not valid.
	120606	Unknown Error
Example	DS:> 1206 1 120600: Test OK @	

Nucleus Name	DS_SYS_DvidNumberSet	
Nucleus Number	1207	
Description	Set the IEEE 1394 unique ID	
Technical	<ul style="list-style-type: none"> - Decode the user input - Store the id into NVRAM - Validate the segment of storage by updating the checksum 	
Execution Time	Less than 1 second.	

User Input	The unique ID to be set.	
Error	Number	Description
	120700	Setting the unique DV ID succeeded
	120701	User input is not valid.
	120702	Setting the unique DV ID failed.
	120703	Write succeeded, but checksum is corrupt.
Example	DS:> 1207 1234567890 120700: Test OK @	

Nucleus Name	DS_SYS_DvidNumberGet	
Nucleus Number	1208	
Description	Get the IEEE1394 unique ID	
Technical	- Read out the ID from the configuration segment and return this info to the user	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	120800	Getting the unique DV ID succeeded
	120801	Getting the unique DV ID failed
	120802	Reading an unexpected section version in NVRAM
Example	DS:> 1208 120800: The DvidNumber is: 1234567890 Test OK @	

Nucleus Name	DS_SYS_licWrite	
Nucleus Number	1209	
Description	Perform an IIC write action on the digital board	
Technical	- Determine bus ID, slave address, number of bytes to be written and the byte array of data from the user input - Initialise IIC - Write the data to the slave specified through IIC	
Execution Time	Less than 1 second	
User Input	The user input the number of bytes to write followed by the bytes to write: <...> Where the bus id is either 0 (normally used) or 1	
Error	Number	Description
	120900	Writing the data over IIC succeeded
	120901	The IIC bus was not accessible
	120902	There was a timeout writing to the device
	120903	The IIC acknowledge was not received
	120904	The communication with the device failed
	120905	Got unknown IIC bus error:
	120906	Unable to initialise IIC bus
	120907	Decoding bus ID unsigned value failed
	120908	Decoding slaveAddr unsigned value failed
	120909	Decoding nrBytes unsigned value failed
	120910	Bus ID out of range
	120911	nrBytes out of range
	120912	Unable to decode parameters
Example	DS:> 1209 0 0xa0 1 0x6 120900: 1 Bytes written Test OK @	

Nucleus Name	DS_SYS_licRead	
Nucleus Number	1210	
Description	Perform an IIC read action on the digital board	
Technical	- Determine the bus ID, slave address and number of bytes to read from the user input - Initialise IIC - Read the data form the slave specified	
Execution Time	Less than 1 second	

User Input	The user inputs the bus number, the address to read them from and the number of bytes to read: <BusID><Slave address to read from><Number of bytes to read>Where the bus id is either 0 (normally used) or 1	
Error	Number	Description
	121000	Reading the data over IIC succeeded
	121001	The IIC bus was not accessible
	121002	There was a timeout writing to the device
	121003	The IIC acknowledge was not received
	121004	The communication with the device failed
	121005	There was an unknown IIC bus error
	121006	IIC bus initialisation failed
	121007	Decoding bus ID unsigned value failed
	121008	Decoding slave address unsigned value failed
	121009	Decoding number of bytes unsigned value failed
	121010	Bus ID out of range
	121011	nrBytes out of range
Example	DS:> 1210 0 0xa0 0x20 Read : 0x0000: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0008: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0010: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0018: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 121000: 0 0xa0 0x20 Test OK @	

Nucleus Name	DS_SYS_UartWrite	
Nucleus Number	1211	
Description	Perform an UART write action on the digital board on a specified UART	
Technical	- Decode the user input for the proper port to use - Write out the bytes through the indicated port	
Execution Time	Less than 1 second.	
User Input	The user inputs the UART to write to, the number of bytes and the bytes to be written to the UART. 1=UART port 1 : not used 2=UART port 2 : Bit Engine 3=UART port 3 : Analogue board <UartNr><Number of bytes to write><d1><d2><...><dx>	
Error	Number	Description
	121100	Writing the bytes to the UART succeeded
	121101	The user provided wrong input
	121102	Writing to the UART failed
Example	DS:> 1211 2 2 0xd1 0x01 121100: Test OK @	

Nucleus Name	DS_SYS_UartRead	
Nucleus Number	1212	
Description	Perform an UART read action on the digital board on a specified UART	
Technical	- Decode the user input for the port to read from - Read from the port and return data read to the user	
Execution Time	Less than 1 second.	
User Input	The user inputs the UART to read from. 1=UART port 1 : not used 2=UART port 2 : Bit Engine 3=UART port 3 : Analogue board <UartNr >	
Error	Number	Description
	121200	Reading the data from the UART succeeded
	121201	The user provided wrong input

	121202	Reading the data from the UART failed
Example	DS:> 1212 2 121200: The HEX value that was read is: 0x50 0xD1 0x00 Test OK @	

Nucleus Name	DS_SYS_VideoLoopThroughStart																																		
Nucleus Number	1213																																		
Description	The video signal, which is conform the user input, is routed from the input to the output. The input is set using the proper nucleus to route the signal on the board(s). All outputs are enabled.																																		
Technical	<ul style="list-style-type: none"> - Decode the videosignal: PAL / NTSC and Y/C, RGB, CVBS,YUV - Initialise the Video Input Processor and check for valid signal - Initialise the Video Front End and start capturing frames to memory - Initialise the SYNC module - Initialise the Video Post Processing and retrieve frames from memory - Initialise the mixer - Initialise the DENC module - Route the signal to all outputs 																																		
Execution Time	Less than 1 second, but stays running.																																		
User Input	<vipInput> <VideoOutput> <VideoStandard> 1. vipInput (CVBS, YC, YUV, RGB, 1 to 9(see table below)). LECO Premier specific <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">User input</th><th style="text-align: left;">Video input</th><th style="text-align: left;">Data path to VIP</th></tr> </thead> <tbody> <tr><td>1</td><td>RGB</td><td>SCART aux RGB in</td></tr> <tr><td>2</td><td>YC</td><td>SCART aux Y/C in</td></tr> <tr><td>3</td><td>CVBS</td><td>SCART aux CVBS</td></tr> <tr><td>4</td><td>CVBS</td><td>Tuner</td></tr> <tr><td>5</td><td>YC</td><td>Front Y/C</td></tr> <tr><td>6</td><td>CVBS</td><td>Front CVBS</td></tr> <tr><td>7</td><td>CVBS</td><td>SCART TV CVBS</td></tr> <tr><td>8</td><td>YC</td><td>CE mode Y/C in</td></tr> <tr><td>9</td><td>CVBS</td><td>CE mode CVBS in</td></tr> <tr><td>10</td><td>XPORT</td><td>XPORT</td></tr> </tbody> </table> 2. VideoOutput (YUV, RGB). 3. VideoStandard (PAL, NTSC).		User input	Video input	Data path to VIP	1	RGB	SCART aux RGB in	2	YC	SCART aux Y/C in	3	CVBS	SCART aux CVBS	4	CVBS	Tuner	5	YC	Front Y/C	6	CVBS	Front CVBS	7	CVBS	SCART TV CVBS	8	YC	CE mode Y/C in	9	CVBS	CE mode CVBS in	10	XPORT	XPORT
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6	CVBS	Front CVBS																																	
7	CVBS	SCART TV CVBS																																	
8	YC	CE mode Y/C in																																	
9	CVBS	CE mode CVBS in																																	
10	XPORT	XPORT																																	
Error	Number	Description																																	
	121300	Video LoopthroughStart succeeded																																	
	121301	User input is not valid.																																	
	121302	Initialisation of the VIP failed.																																	
	121303	Unable to stop the loop through before restarting.																																	
	121304	Video Signal on the input is not a valid signal.																																	
	121305	Initialisation of the VFE failed.																																	
	121306	The digital board hardware information is corrupt																																	
Example	DS:> 1213 CVBS RGB PAL 121300: Test OK @																																		

Nucleus Name	DS_SYS_VideoLoopThroughStop	
Nucleus Number	1214	
Description	Stop routing the video input to all the outputs.	
Technical	Stop the DENC and the Video Front End	
Execution Time	Less than 1 second.	
User Input	-	
Error	Number	Description
	121400	VideoLoopthroughStop succeeded
	121401	DENC module on Codec failed.
Example	DS:> 1214 121400: Test OK @	

Nucleus Name	DS_SYS_VideoLoop	
Nucleus Number	1215	

Description	<p>The Codec generates a video signal with a specific signature and sends it to the output of the digital board. The user selects which video input path must be routed on the digital board and a video standard. The Codec encodes the video signal, checks the signature, and returns a conclusion.</p> <p>Note: Before executing this nucleus the user must route the video signal on the analog board with the proper nucleus.</p>																																		
Technical	<ul style="list-style-type: none"> - Evaluate user input. - Reset the global variables, video memory. - Fill the video memory with a vertical colourbar. - Initialise the Codec SYNC-module. - Initialise the Codec MIXER-module. - Initialise the Codec VPP-module. - Initialise the Codec DENC-module. - Display the original image. - Initialise the VIP. - Initialise the Codec VFE-module. - Try to detect a sync in the VIP input. - Catch the received image in memory. - Display the received image. - Compare the received image with original image. - Create a conclusion. 																																		
Execution Time	3 seconds.																																		
User Input	<p>Video input of the digital board:</p> <ul style="list-style-type: none"> - CVBS - YC - YUV - RGB - TEST (The video output will be routed to the video input on the digital board.) - 1 to 9 - LECO Premier specific (see table below) <table border="1"> <thead> <tr> <th>User input</th><th>Video input</th><th>Data path to VIP</th></tr> </thead> <tbody> <tr><td>1</td><td>RGB</td><td>SCART aux RGB in</td></tr> <tr><td>2</td><td>YC</td><td>SCART aux Y/C in</td></tr> <tr><td>3</td><td>CVBS</td><td>SCART aux CVBS</td></tr> <tr><td>4</td><td>CVBS</td><td>Tuner</td></tr> <tr><td>5</td><td>YC</td><td>Front Y/C</td></tr> <tr><td>6</td><td>CVBS</td><td>Front CVBS</td></tr> <tr><td>7</td><td>CVBS</td><td>SCART TV CVBS</td></tr> <tr><td>8</td><td>YC</td><td>CE mode Y/C in</td></tr> <tr><td>9</td><td>CVBS</td><td>CE mode CVBS in</td></tr> <tr><td>10</td><td>XPORT</td><td>XPORT</td></tr> </tbody> </table> <p>Video standard:- PAL - NTSC</p> <p>When no input is given, the nucleus will take TEST for video input and PAL for video standard.</p>		User input	Video input	Data path to VIP	1	RGB	SCART aux RGB in	2	YC	SCART aux Y/C in	3	CVBS	SCART aux CVBS	4	CVBS	Tuner	5	YC	Front Y/C	6	CVBS	Front CVBS	7	CVBS	SCART TV CVBS	8	YC	CE mode Y/C in	9	CVBS	CE mode CVBS in	10	XPORT	XPORT
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10	XPORT	XPORT																																	
Error	Number	Description																																	
	121500	Videoloop test succeeded.																																	
	121501	Wrong user input.																																	
	121502	The Codec SYNC-module cannot be initialised.																																	
	121503	The Codec MIXER-module cannot be initialised.																																	
	121504	The Codec VideoPostProcessor-module cannot be initialised.																																	
	121505	The Codec DENC-module cannot be initialised.																																	
	121506	The VideoInputProcessor cannot be initialised.																																	
	121507	The VideoInputProcessor cannot detect a sync-signal.																																	
	121508	The Codec VideoFrontEnd-module cannot be initialised.																																	
	121509	The Codec VideoFrontEnd-module cannot capture a video field.																																	
	121510	When selected the RGB video input: Error in colour red signal and/or Error in colour green signal and/or Error in colour blue signal. When selected one of the other video inputs: Error in luminance signal (Y) and/or Error in chrominance signal (U) and/or Error in chrominance signal (V).																																	

	121511	The digital board hardware information is corrupt
Example	DS:> 1215 cvbs ntsc 121500: Test OK @ DS:> 1215 cvbs pal 121508: The VideoInputProcessor cannot detect a sync-signal. Error @ DS:> 1215 yuv ntsc 121511: Error in luminance signal(Y) Error in chrominance signal(U) Error in chrominance signal(V) Error @	

Nucleus Name	DS_SYS_AudioLoop	
Nucleus Number	1216	
Description	<p>The user first needs to select how the audio path must be routed on the analogue board and/or digital board before calling this nucleus. The user also has to route the audio outputs back to the inputs by means of cables.</p> <p>In this nucleus the Codec generates an audio sine signal with a specific signature and sends it to the output of the digital board. The Codec encodes the audio signal to MPEG I layer II and after this the signature of the signal will be checked.</p>	
Technical	<ul style="list-style-type: none"> - The user needs to route the signal to the audio inputs so the test can encode the audio to MPEG I layer II - An audio signal is generated, resulting in a sine of 6kHz on the left and 12kHz on the right channel. - Then the signal is decoded in memory. - When both signals are detected correctly in the MPEG, the test succeeded. 	
Execution Time	Approximately 9 seconds	
User Input	None	
Error	Number	Description
	121600	Testing the components on the audio signal path succeeded
	121601	The audio encoder did not initialise.
	121602	No audio could be generated.
	121603	The audio encoder did not encode audio.
	121604	The audio could not be decoded.
	121605	Frequency on left channel out of range.
	121606	Frequency on right channel out of range.
	121607	The frequencies on both channels are out of range.
	121608	Frequency on left channel out of range. Right channel silent.
	121609	Right channel is silent.
	121610	Frequency on right channel out of range. Left channel silent.
	121611	Left channel is silent.
	121612	Both channels are silent.
Example	DS:> 1216 121600: Test OK @	

Nucleus Name	DS_SYS_SlashVersionSet	
Nucleus Number	1217	
Description	Set the slash version of the system	
Technical	<ul style="list-style-type: none"> - Decode the user input for the slash version to set - Issue the command to set the slash version to the analogue board 	
Execution Time	Less than 1 second.	
User Input	The slash version	
Error	Number	Description
	121700	Setting the slash version succeeded
	121701	Invalid slash version, no slash version is set.
	121702	Setting the slash version on the Analogue Board fails.
	121703	Invalid input.

	121704	The returned error code from the analogue board is unknown:
	121705	No DS error code known for analogue board error:
	121706	There was no response from the analogue board.
	121707	Retrieving the current version failed
	121708	Unknown recorder layout type
	121709	Validating the section where the version is stored failed
	121710	Getting the configuration section from NVRAM failed
	121711	Initialisation of IIC or reaching NVRAM failed
Example	DS:> 1217 82 121700: Test OK @	

Nucleus Name	DS_SYS_SlashVersionGet	
Nucleus Number	1218	
Description	Get the slash version of the system	
Technical	<ul style="list-style-type: none"> - Issue the command to get the slash version to the analogue board - Return the received information to the user 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	121800	Getting the slash version succeeded
	121801	Getting the slash version failed
	121802	The IIC write failed
	121803	The IIC read failed
	121804	There was no response from the analogue board.
	121805	No DS error code known for analogue board error:
	121806	Reading the slash version failed
	121807	Initialisation of IIC or reaching NVRAM failed
	121808	Reading an unexpected section version in NVRAM
Example	DS:> 1218 121800: The slash version is: 82 Test OK @	

Nucleus Name	DS_SYS_Virginize	
Nucleus Number	1219	
Description	(Re-) Virginize the recorder. User data in the NVRAM of the analogue board is cleared	
Technical	Issue the command to return to the factory defaults to the analogue board	
Execution Time	1 second.	
User Input	None	
Error	Number	Description
	121900	Virginization succeeded
	121901	Virginization on the Analogue Board failed.
	121902	The returned error code from the analogue board is unknown:
	121903	No DS error code known for analogue board error:
	121904	There was no response from the analogue board.
Example	DS:> 1219 121900: Test OK @	

Nucleus Name	DS_SYS_VirginModeOn	
Nucleus Number	1220	
Description	Turn on the virgin mode functionality (e.g. the auto channel search upon start-up)	
Technical	Issue the command to set the bit for the virgin mode to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122000	Turning on the virgin mode succeeded
	122001	Turning on VirginMode on the Analogue Board failed.
	122002	The returned error code from the analogue board is unknown:
	122003	No DS error code known for analogue board error:

	122004	There was no response from the analogue board.
	122005	Section validation or write failed in NVRAM
	122006	Reading the CONFIG section from NVRAM failed
	122007	Initialisation of IIC or reaching NVRAM failed
Example	DS:> 1220 122000: Test OK @	

Nucleus Name	DS_SYS_VirginModeOff	
Nucleus Number	1221	
Description	Turn off the virgin mode functionality (e.g. the auto channel search upon start-up)	
Technical	Issue the command to reset the bit for the virgin mode to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122100	Turning off the virgin mode succeeded
	122101	Turning off VirginMode on the Analogue Board failed.
	122102	The returned error code from the analogue board is unknown:
	122103	No DS error code known for analogue board error:
	122104	There was no response from the analogue board.
	122105	Section validation or write failed in NVRAM
	122106	Reading the CONFIG section from NVRAM failed
	122107	Initialisation of IIC or reaching NVRAM failed
Example	DS:> 1221 122100: Test OK @	

Nucleus Name	DS_SYS_VirginModeGet	
Nucleus Number	1222	
Description	Get the virgin mode functionality status (e.g. the auto channel search upon start-up)	
Technical	Issue the command to reset the bit for the virgin mode to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122200	Getting the virgin mode succeeded
	122201	Reading the Virgin Mode flag from NVRAM failed
	122202	Initialisation of IIC or reaching the NVRAM failed
	122203	Reading an unexpected version of the section in NVRAM
Example	DS:> 1222 122200: The Virgin Mode functionality is: ON Test OK @	

Nucleus Name	DS_SYS_DisplayFatalOn	
Nucleus Number	1223	
Description	Turn on the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically	
Technical	Issue the command to use the display-fatal functionality to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122300	Turning on the display-fatal functionality succeeded
	122301	Turning on the display-fatal functionality failed
	122302	The returned error code from the analogue board is unknown:
	122303	No DS error code known for analogue board error:
	122304	There was no response from the analogue board.
	122305	Section validation or write failed in NVRAM
	122306	Reading the section from NVRAM failed
	122307	Initialisation of IIC or reaching NVRAM failed
Example	DS:> 1223 122300: Test OK @	

Nucleus Name	DS_SYS_DisplayFatalOff	
Nucleus Number	1224	
Description	Turn off the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically	
Technical	Issue the command to stop using the display-fatal functionality to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122400	Turning off the display-fatal functionality succeeded
	122401	Turning off the display-fatal functionality failed
	122402	The returned errorcode from the analogue board is unknown:
	122403	No DS errCode known for analogue board error:
	122404	There was no response from the analogue board.
	122405	Section validation or write failed in NVRAM
	122406	Reading the section from NVRAM failed
	122407	Initialisation of IIC or reaching NVRAM failed
Example	DS:> 1224 122400: Test OK @	

Nucleus Name	DS_SYS_DisplayFatalGet	
Nucleus Number	1225	
Description	Get the display-fatal flag of the recorder	
Technical	Issue the command to get the status of the display-fatal functionality to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122500	Getting the display-fatal flag succeeded
	122501	Getting the display-fatal flag failed
	122502	The returned errorcode from the analogue board is unknown:
	122503	No DS errCode known for analogue board error:
	122504	There was no response from the analogue board.
	122505	Reading the display fatal flag failed
	122506	Initialisation of IIC or reaching NVRAM failed
	122507	Unexpected version read from NVRAM section
	122508	Reading the fatal flag from NVRAM failed
Example	DS:> 1225 122500: The Display Fatal functionality is ON Test OK @	

Nucleus Name	DS_SYS_SettingsSet	
Nucleus Number	1226	
Description	Programs the digital board settings into the boot EEPROM on the digital board.	
Technical	Evaluate user input. Set-up IIC-bus. Write data to boot EEPROM. Update checksum.	
Execution Time	1 second	
User Input	A large hexadecimal value that represents the digital board settings obtained from the XDIVTOOL.exe program or from a reference set.	
Error	Number	Description
	122600	The settings were successfully programmed.
	122601	User input is invalid.
	122602	IIC access failed.
Example	DS:> 1226 6469616774737462010102000101010101000020080000 122600: Test OK @	

Nucleus Name	DS_SYS_SettingsDisplay	
Nucleus Number	1228	
Description	Show the settings that are programmed in the BROM on the digital board.	
Technical	Set-up IIC-bus. Read Digital Board Settings from boot EEPROM. Display the settings.	

Execution Time	1 second	
User Input	None.	
Error	Number	Description
	122800	The settings were successfully displayed.
	122801	IIC access failed.
	122802	Invalid settings
Example	DS:> 1228 Settings ID: 444248491D9420014E46332B0000000029040303000101020001010040080800 Board name: NF3+ Hardware ID: 29 Codec IC: PNX7100_C2/C3 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: S2301 Progressive Scan Denc IC: None I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: not available IDE connector 1: available IDE connector 2: available PCI connector: not available RAM size: 64MByte ROM size (NOR FLASH bank 1): 8MByte ROM size (NOR FLASH bank 2): 8MByte ROM size (NAND FLASH): Not available Bit Engine: AV 3.1 122800: Test OK @	

Nucleus Name	DS_SYS_SettingsGet	
Nucleus Number	1229	
Description	Get the digital board diversity settings string that is programmed in the BROM on the digital board.	
Technical	<ul style="list-style-type: none"> - Set-up IIC-bus. - Read Digital Board Settings from boot EEPROM. - Read System Settings from boot EEPROM.-Display the settings. 	
Execution Time	1 second	
User Input	None.	
Error	Number	Description
	122900	The settings were successfully displayed.
	122901	IIC access failed.
	122902	The settings are invalid
Example	DS:> 1229 122900: 6D7920626F61726400020300010101020101000020080000 Test OK @	

Nucleus Name	DS_SYS_AudioLoopThroughStart	
Nucleus Number	1230	
Description	Description: The audio input is routed from the input to all outputs. The input is set routing the signal with the proper nucleus. All outputs are enabled.	
Technical	<ul style="list-style-type: none"> - Encode the audio to AC3 in memory - Decode the AC3 in memory to audio on the outputs 	
Execution Time	1second buffer time and 30 seconds playing.	
User Input	None.	
Error	Number	Description
	123000	AudioLoopthroughStart succeeded
	123001	Resetting the audio decoder failed
	123002	Resetting the audio encoder failed
	123003	Encoding the audio failed
	123004	Decoding the audio failed
Example	DS:> 1230 123000: Test OK @	

Nucleus Name	DS_SYS_AudioLoopThroughStop	
Nucleus Number	1231	
Description	Stop routing the audio input to all the outputs	
Technical	Send the Mute command to the audio decoder and reset the audio decoder	
Execution Time	Less than 1 second.	
User Input	-	
Error	Number	Description
	123100	AudioLoopthroughStop succeeded
	123101	Resetting the audio decoder failed
	123102	Resetting the audio encoder failed
Example	DS:> 1231 123100: Test OK @	

Nucleus Name	DS_SYS_SettingsHwIdSet	
Nucleus Number	1232	
Description	This nucleus sets the HW-Id in the HW-diversity string	
Technical	<ul style="list-style-type: none"> - Read out the HW-diversity string - Modify the HW-ID in that string as requested - Write the modified HW-diversity string to the EEPROM 	
Execution Time	Less than 1 second.	
User Input	- The hardware ID to set No input - The user will be asked for the ID	
Error	Number	Description
	123200	Setting the hardware ID succeeded
	123201	Setting the hardware ID failed
	123202	The user aborted setting the hardware ID, no changes made
Example	DS:> 1232 Enter the new HW ID of the digital board (Currently equals 21) Enter a value between 0 and 99: > 22 The HW ID will be set to: 22. Is that correct? ([Y/N]):y 123200: Test OK @ DS:> 1232 Enter the new HW ID of the digital board (Currently equals 22) Enter a value between 0 and 99: > The HW ID will be set to: 0. Is that correct? ([Y/N]):N 123202: Setting the HW ID was aborted by the user. Error @ DS:> 1232 99 123200: Test OK @	

Nucleus Name	DS_SYS_SettingsDoubleCheck	
Nucleus Number	1233	
Description	Double check whether stored HW-string equals actual HW as far as we can automatically detect this. An automatic and a manual mode is supported.	
Technical	<ul style="list-style-type: none"> - Read out the HW diversity string - Check whether these settings correspond the actual hardware - In case of modification: Write back the new HW-diversity settings. 	
Execution Time	4 seconds in auto mode when everything matches	
User Input	<ul style="list-style-type: none"> - 'manual' or 'MANUAL' to enter manual mode - default is automatic mode where the nucleus stops upon and reports the first encountered error 	
Error	Number	Description
	123300	Double checking the HW-diversity settings succeeded
	123301	Double check failed, a difference in settings was encountered
	123302	Reading the HW-diversity settings failed

	123303	Writing the modified HW-diversity settings failed
Example	<p>DS:> 1233 123300: Test OK @</p> <p>DS:> 1233 manual 123300: Test OK @</p> <p>DS:> 1233 123301: Hardware ID mismatch: in HW-Diversity string:99, actual in FLASH:0 Error @</p> <p>DS:> 1233 manual Hardware ID mismatch! in HW-Diversity string:99, actual in FLASH:0</p> <p>Enter the correct HW ID of the digital board. > 0 The HW-diversity string has been modified by you. Settings:</p> <p>Board name: DIAG Hardware ID: 0 Codec IC: PNX7100_MF3 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC: ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: available IDE connector 1: available IDE connector 2: not available PCI connector: not available RAM size 32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH) Not available</p> <p>Is it OK to program this in the new HW-diversity string? ([y]es/[n]o):y Diversity HW-string programmed successfully.</p> <p>123300: Test OK @</p> <p>DS:></p>	

Nucleus Name	DS_SYS_SettingsDITableFilenameSet	
Nucleus Number	1234	
Description	This nucleus sets the Download table filename in the HW-diversity string	
Technical	<ul style="list-style-type: none"> - Retrieve the new filename from the user - Ask the user whether the filename is correct before setting it - Update the diversity settings to use the newly entered filename 	
Execution Time	Dependent on the user confirmation	
User Input	<ul style="list-style-type: none"> - The filename to be set - No input - No new filename will be set 	
Error	Number	Description
	123400	Setting the new filename succeeded
	123401	Unsupported setting of the current HW-diversity settings

	123402	Setting the filename was aborted by the user.
Example	<p>DS:> 1234 Enter the new Download Table Filename (Currently equals DVDR2001.001) Enter a filename: > The Download Table Filename will be set to: DVDR2001.001. Is that correct? ([Y/N]): 123402: Setting the filename was aborted by the user. Error @</p> <p>DS:> 1234 Enter the new Download Table Filename (Currently equals DVDR2001.001) Enter a filename: >DVDR2002.001 The Download Table Filename will be set to: DVDR2002.001. Is that correct? ([Y/N]):Y 123400: Test OK @</p>	

Nucleus Name	DS_SYS_licWriteRead	
Nucleus Number	1235	
Description	Perform an IIC write-read action on the digital board	
Technical	<ul style="list-style-type: none"> - Determine bus ID, slave address, number of bytes to be written and the byte array of data from the user input - Initialise IIC - Write the data to the IIC slave - Read the data from the IIC slave 	
Execution Time	Less than 1 second	
User Input	<p>The user inputs the Bus ID, Slave Address, number of bytes to read, number of bytes to write and the bytes to be written <NucNr><BusId><SlaveAddr><ReadLen><WriteLen><WrByte0...WrByteN> Max number of bytes to write: 255 Max number of bytes to read: 255</p>	
Error	Number	Description
	123500	Writing data to and reading data from the IIC slave succeeded
	123501	The IIC bus was not accessible
	123502	There was a bus timeout reading the device
	123503	The IIC acknowledge was not received
	123504	Unable to initialise IIC bus
	123505	The communication with the device failed
	123506	Unknown IIC bus error received
	123507	Decoding bus ID unsigned value failed
	123508	Decoding slave address unsigned value failed
	123509	Decoding number of bytes unsigned value failed
	123510	Bus ID out of range
	123511	Number of bytes out of range
Example	<p>DS:> 1235 0 0xa0 0xf 1 0 0x0000: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0008: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 121000: Test OK @</p>	

Nucleus Name	DS_SYS_UartSetup	
Nucleus Number	1236	
Description	Set up a configuration for the selected UART	
Technical	<ul style="list-style-type: none"> - Parse user input - Use MIS_UART_Setup to setup the selected UART with the requested parameters 	
Execution Time	Less than 1 second	

User Input	The user inputs 6 parameters: <UartNr><baudrate><flowcontrol><databits><parity><stopbits> UartNr: 1=UART port 1 : not used (Chrysalis only) 2=UART port 2 : Bit Engine or DTTM (Chrysalis only) 3=UART port 3 : Analogue board baudrate: 115200,62500,57600,38400,19200,9600,4800,2400,1200 flowcontrol: 0=disabled 1=enabled databits: 7 or 8 parity: "NO", "ODD" or "EVEN" stopbits: 1 or 2	
Error	Number	Description
	123600	Setting up the selected UART succeeded
	123601	User provided Invalid setup parameters
	123602	Setting up the selected UART Failed
	123603	Selected UART is not available
Example (Chrysalis)	DS:> 1236 2 38400 0 8 NO 1 123600: Test OK @	
Example (Leco)	DS:> 1236 2 38400 0 8 NO 1 123603: The selected UART is not available Error @	

Electronic Program Guide Board (EPGB)

Nucleus Name	DS_EPGB_VersionGet	
Nucleus Number	1300	
Description	Returns the version of the EPG board.	
Technical	- Issue the command to get the version of the EPG board to the analogue board - Return the received information to the user	
Execution Time	3 seconds.	
User Input	None	
Error	Number	Description
	130000	Getting the version succeeded
	130001	Communication with the analog board failed.
	130002	Communication with the EPG board failed.
	130003	There was no response from the analogue board.
	130004	No DS error code known for analogue board error.
Example	DS:> 1300 130000: Version : 6.1.9 Test OK @	

ANALOGUE SLAVE PROCESSOR (ASP)

Nucleus Name	DS_ASP_Communication	
Nucleus Number	1600	
Description	This nucleus checks the communication between the IIC controller of the Codec and the ASP.	
Technical	- Initialise IIC-bus. - Read something from ASP. - Handle the errorcode.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160000	Communicating with the ASP succeeded
	160001	The IIC bus was not accessible
	160002	There was a timeout reading the device
	160003	The IIC acknowledge was not received
	160004	An IIC-bus error occurred
	160005	Got unknown IIC bus error

	160006	The IIC bus initialisation failed
Example	DS:> 1600 160000: Test OK @	

Nucleus Name	DS_ASP_Version	
Nucleus Number	1601	
Description	This nucleus returns the version number of the software running on the ASP and if available that of the display driver.	
Technical	Read versions from ASP and display it.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160100	Retrieving the software versions succeeded
	160101	The IIC bus initialisation failed.
	160102	The IIC bus failed.
	160103	The CRC checksum of the message is wrong.
Example	DS:> 1601 160100: Software version : 0.9 Display driver version: 0.1 Hardware version : 0x02 Hardware layout : 0x03 Hardware revision : 0x00 Test OK @	

Nucleus Name	DS_ASP_RealTimeClockSetValues	
Nucleus Number	1602	
Description	This nucleus is used to set the real time clock to the correct values.	
Technical	<ul style="list-style-type: none"> - Decode the user input. - Write RTC value to ASP. 	
Execution Time	Less than 1 second.	
User Input	User must give time and date like this: hh:mm:ss dd/mm/yy	
Error	Number	Description
	160200	Setting the real time clock succeeded
	160201	The ASP initialisation failed.
	160202	The IIC bus failed.
	160203	Wrong user input.
Example	DS:> 1602 03:20:01 22/06/03 160200: Test OK @	

Nucleus Name	DS_ASP_RealTimeClockGetValues	
Nucleus Number	1603	
Description	This nucleus is used to retrieve the actual real time from the ASP	
Technical	<ul style="list-style-type: none"> - Read RTC value from ASP. - Decode the RTC value. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160300	Retrieving the real time succeeded
	160301	The ASP initialisation failed.
	160302	The IIC bus failed.
	160303	The CRC checksum of the message is wrong.
	160304	The Real Time Clock has been found invalid and thus set to default values.
Example	DS:> 1603 Time: 03:20:17 Date: 22/06/03 (dd/mm/yy) 160300: Test OK @	

Nucleus Name	DS_ASP_RealTimeClockSetCorrection	
Nucleus Number	1604	
Description	This nucleus sets the correction value needed for the real time clock	

Technical	T.B.D. !!	
Execution Time	Less than 1 second.	
User Input	none	
Error	Number	Description
	160400	Setting the correction values succeeded
Example	DS:> 1604 160400: T.B.D. !! Test OK @	

Nucleus Name	DS_ASP_RealTimeClockAdjustment	
Nucleus Number	1605	
Description	This nucleus sets a test signal for clock crystal measurement. The signal with a frequency of 1 kHz and duty cycle of 50% appears on pin RCC.	
Technical	Send Clock Adjustment command to the ASP.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160500	The test succeeded
	160501	The ASP initialisation failed.
	160502	The IIC bus failed.
Example	DS:> 1605 160500: Test OK @	

Nucleus Name	DS_ASP_NTCGet	
Nucleus Number	1606	
Description	This nucleus reads the value of the NTC-resistor connected to the ASP, which tells the ambient temperature to the processor.	
Technical	<ul style="list-style-type: none"> - Read the ADC input pin of the ASP that is connected to the NTC-resistor. - Display this value. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160600	Getting the NTC-value succeeded
	160601	The IIC bus failed
Example	DS:> 1606 160600: Temperature(NTC) ADC input value = 0x94 Test OK @	

Nucleus Name	DS_ASP_FanSpeedSet	
Nucleus Number	1607	
Description	This nucleus sets the speed of the fan that controls the temperature within the set.	
Technical	<ul style="list-style-type: none"> - Decode user input. - Set pio-pins FAN_C1 and FAN_C2. 	
Execution Time	Less than 1 second.	
User Input	Speed to be set: off, low, medium, high	
Error	Number	Description
	160700	Setting the new fan speed succeeded
	160701	The IIC bus failed
	160702	The user provided wrong input
Example	DS:> 1607 low 160700: Test OK @	

Nucleus Name	DS_ASP_LightDisplay	
Nucleus Number	1608	
Description	This nucleus lights the entire display.	
Technical	<ul style="list-style-type: none"> - Set all segments on in the display buffer. - Set the grids correct in the display buffer. - Send the display buffer to the ASP. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160800	Lighting the entire display succeeded

	160801	IIC-bus communication failed
Example	DS:> 1608 160800: Test OK @	

Nucleus Name	DS_ASP_BlinkDisplay	
Nucleus Number	1609	
Description	This nucleus lights the entire display, and lets it blink.	
Technical	<ul style="list-style-type: none"> - Set all segments on in the blink buffer. - Set the grids correct in the blink buffer. - Send the blink buffer to the ASP. 	
Execution Time	Less than 1 second.	
User Input	None or on to start the blinking of the display. off To stop the blinking of the display.	
Error	Number	Description
	160900	The test succeeded
	160901	IIC-bus communication failed
	160902	The user provided wrong input
Example	DS:> 1609 160900: Test OK @ DS:> 1609 off 160900: Test OK @	

Nucleus Name	DS_ASP_DimmingDisplay	
Nucleus Number	1610	
Description	This nucleus lights the entire display, and dims it.	
Technical	Change in a loop the display brightness from maximum to minimum.	
Execution Time	Less than 1 second.	
User Input	ON or OFF	
Error	Number	Description
	161000	The test succeeded
	161001	IIC-bus communication failed
	161002	The user provided wrong input
Example	DS:> 1610 ON 161000: Test OK @	

Nucleus Name	DS_ASP_ClearDisplay	
Nucleus Number	1611	
Description	This nucleus clears the display and deactivates dimming/blinking functionality	
Technical	<ul style="list-style-type: none"> - Make the display buffer empty. - Make the blink buffer empty. - Send the display buffer to the ASP. - Send the blink buffer to the ASP. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	161100	The test succeeded
	161101	IIC-bus communication failed
Example	DS:> 1611 161100: Test OK @	

Nucleus Name	DS_ASP_KeyBoard	
Nucleus Number	1612	
Description	This nucleus checks all keys of the keyboard by having the user confirm the key-code displayed of all keys. If the user presses a or A the test is aborted. If the user presses o or O the test is indicated as OK. If the user holds down PLAY for more than a second the test is indicated as OK, if the user holds down RECORD the test is indicated as failed.	

Technical	<ul style="list-style-type: none"> - Initialise the display. - Display the key pressed by the user on the display. - Monitor the service port for an abort and get the next key pressed. - Update the display and repeat previous steps until user stops / confirms. - Display the number of keys that were pressed. 	
Execution Time	Depends on the user.	
User Input	None	
Error	Number	Description
	161200	Checking all keys succeeded
	161201	IIC-bus communication failed
	161202	The user signals a failure of the keyboard
	161203	The user aborted the test
Example	DS:> 1612 161200: Test OK @	

Nucleus Name	DS_ASP_RemoteControl	
Nucleus Number	1613	
Description	This nucleus checks the interface to the remote control by having the user confirm the key-code displayed. At least one key must be tested. If the user presses a or A the test is aborted. If the user presses o or O the test is indicated as OK. If the user holds down PLAY for more than a second the test is indicated as OK, if the user holds down RECORD the test is indicated as failed.	
Technical	<ul style="list-style-type: none"> - Initialise the display. - Display the key pressed by the user on the display. - Monitor the service port for an abort and get the next key pressed. - Update the display and repeat previous steps until user stops / confirms. - Display the number of keys that were pressed. 	
Execution Time	Depends on the user.	
User Input	None	
Error	Number	Description
	161300	The test succeeded
	161301	IIC-bus communication failed
	161302	The user signals a failure of the remote control
	161303	The user aborted the test
Example	DS:> 1613 161300: Test OK @	

Nucleus Name	DS_ASP_LEDsOn	
Nucleus Number	1614	
Description	This nucleus switches on the RECORD, TRAY, and EPG-LED, when available	
Technical	<ul style="list-style-type: none"> - Check if the analogue board is a MOBO board, if so: - Read the ASP pio port. - Set the RECORD-LED bit on in this port. - Write the ASP pio port. - Read the ASP pio port. - Set the TRAY-LED bit on in this port. - Write the ASP pio port. - Read the ASP pio port. - Set the EPG-LED bit on in this port. - Write the ASP pio port. - Else - Set the RECORD-LED bit on. - Write the external ASP pio port. - Set the TRAY-LED bit on. - Write the external ASP pio port. - Set the EPG-LED bit on. - Write the external ASP pio port. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	161400	Switching on the LEDs succeeded
	161401	IIC-bus communication failed
Example	DS:> 1614 161400: Test OK @	

Nucleus Name	DS_ASP_LEDsOff	
Nucleus Number	1615	
Description	This nucleus switches off the RECORD, TRAY, and EPG-LED, when available	
Technical	<ul style="list-style-type: none"> - Check if the analogue board is a MOBO board, if so: - Read the ASP pio port. - Set the RECORD-LED bit off in this port. - Write the ASP pio port. - Read the ASP pio port. - Set the TRAY-LED bit off in this port. - Write the ASP pio port. - Read the ASP pio port. - Set the EPG-LED bit off in this port. - Write the ASP pio port. - Else - Set the RECORD-LED bit off. - Write the external ASP pio port. - Set the TRAY-LED bit off. - Write the external ASP pio port. - Set the EPG-LED bit off. - Write the external ASP pio port. 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	161500	Switching off the LEDs succeeded
	161501	IIC-bus communication failed
Example	DS:> 1615 161500: Test OK @	

Nucleus Name	DS_ASP_Reset	
Nucleus Number	1616	
Description	This nucleus resets the ASP.	
Technical	<ul style="list-style-type: none"> - Reset the ASP by toggling the reset wire by a GPIO pin of the codec. - Wait 500ms according to the HSI.-Read Status from ASP. - Put ASP in normal mode.-Configure general ASP PIO. - Make a ASP pio pin low to read the version. - Get GPP40 - GPP47 and GPP48 - GPP55. - Decode hardware version, revision, and layout. - Configure the ASP clock. - Configure display, part 1. - Configure display, part 2. - Configure blinking. - Configure external ASP PIO. - Configure ADC input. - Configure remote control input. - Enable power on the AV3. 	
Execution Time	3 seconds.	
User Input	None	
Error	Number	Description
	161600	Reset command succeeded
	161601	IIC-bus communication failed
Example	DS:> 1616 161600: Test OK @	

ANALOGUE BOARD EEPROM (AROM)

Nucleus Name	DS_AROM_Communication	
Nucleus Number	1700	
Description	Check the communication between the IIC controller of the Codec and the EEPROM	
Technical	<ul style="list-style-type: none"> - Initialise IIC - Read from a location in AROM 	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	170000	Something is properly read so the communication is OK
	170001	The IIC bus was not accessible
	170002	There was a timeout reading the device

	170003	The IIC acknowledge was not received
	170004	The communication with the device failed
	170005	The IIC bus failed
	170006	The IIC bus initialisation failed
Example	DS:> 1700 170000: Test OK @	

VIDEO MATRIX (VMIX)

Nucleus Name	DS_VMIX_Communication	
Nucleus Number	1800	
Description	This nucleus checks the communication between the IIC controller of the Codec and the Video Matrix on the analogue board	
Technical	Try to read anything from the video matrix by means of IIC	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	180000	Communicating wit the Video Matrix succeeded
	180001	An IIC-bus error occurred
	180002	There was a timeout reading the device
	180003	The IIC bus was not accessible
	180004	The IIC acknowledge was not received
	180005	There was an IIC error upon the stop-condition
	180006	The IIC bus was chosen wrong
	180007	The IIC functionality is not running
	180008	An unknown error was returned
Example	DS:> 1800 180000: Test OK @	

Nucleus Name	DS_VMIX_Routing	
Nucleus Number	1801	
Description	This nucleus performs the routing of the video signals in the set. It sets the video path according to the user input.	
Technical	<ul style="list-style-type: none"> - Determine whether the set is NAFTA/APAC or EUROPE - Switch the videomatrix according to the input specified by the user 	
Execution Time	Less than 1 second.	
User Input	The user inputs the path Id of choice, as specified in tables below for Europe/NAFTA-APAC	
Error	Number	Description
	180100	Routing the video path succeeded
	180101	The user provided wrong input
	180102	There was no response from the video matrix
	180103	Could not retrieve region from analogue slave processor
Example	DS:> 1801 00 180100: Test OK @	

Table 5-3 Available VIDEO path-Ids for EUROPE routing

EURO Path ID	Description
	(DbOut=Digital Board Output, Dbln = Digital Board Input)
00	DbOut-CVBS/YC/RGB to RearOut-CVBS/YC and Scart_1-RGB.
01	- DbOut-CVBS to RearOut-CVBS. - FrontIn-CVBS to Dbln-CVBS.
02	- DbOut-YC to RearOut-YC. - FrontIn-YC to Dbln-YC.
03	- DbOut-CVBS to Scart_1-CVBS. - Scart_2-CVBS to Dbln-CVBS.
04	- DbOut-YC to Scart_1-YC. - Scart_2-YC to Dbln-YC.
05	- DbOut-RGB to Scart_1-RGB. - Scart_2-RGB to Dbln-RGB.
06	- DbOut-CVBS to RearOut-CVBS. - Tuner-CVBS to Dbln-CVBS.
07	DbOut-CVBS to Dbln-CVBS.
08	DbOut-PSCAN to RearOut-YUV.
09	DbOut-YUV to RearOut-YUV.
10	- DbOut-CVBS to Scart_2-CVBS. - Scart_1-CVBS to Dbln-CVBS.
11	- DbOut-YC to Scart_2-YC. - Scart_1-YC to Dbln-YC.
12	Scart_2-RGB to Scart_1-RGB.
13	Scart_2-CVBS to Scart_1-CVBS.
14	Scart_1-CVBS to Scart_2-CVBS.

Table 5-4 Available VIDEO path-Ids for NAFTA / APAC routing

NAFTA Path ID	Description
	(DbOut=Digital Board Output, Dbln = Digital Board Input)
00	DbOut-CVBS/YC/YUV to RearOut-CVBS/YC/YUV.
01	- DbOut-CVBS to RearOut-CVBS. - FrontIn-CVBS to Dbln-CVBS.
02	- DbOut-YC to RearOut-YC. - FrontIn-YC to Dbln-YC.
03	- DbOut-CVBS to RearOut-CVBS. - RearIn-CVBS to Dbln-CVBS.
04	- DbOut-YC to RearOut-YC. - RearIn-YC to Dbln-YC.
05	- DbOut-YUV to RearOut-YUV. - RearIn-YUV to Dbln-YUV.
06	- DbOut-CVBS to RearOut-CVBS. - Tuner-CVBS to Dbln-CVBS.
07	DbOut-CVBS to Dbln-CVBS.
08	DbOut-PSCAN to RearOut-YUV.

AUDIO MATRIX (SOUND PROCESSOR) (AMIX)

Nucleus Name	DS_AMIX_Communication	
Nucleus Number	1900	
Description	This nucleus checks the communication between the IIC controller of the Codec and the Audio Matrix (sound processor) on the analogue board	
Technical	Test whether anything can be read from the sound processor	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	190000	Communicating wit the Audio Matrix succeeded
	190001	An IIC-bus error occurred
	190002	There was a timeout reading the device
	190003	The IIC bus was not accessible
	190004	The IIC acknowledge was not received
	190005	There was an IIC error upon the stop-condition
	190006	The IIC bus was chosen wrong
	190007	The IIC functionality is not running

	190008	An unknown error was returned
Example	DS:> 1900 190000: Test OK @	

Nucleus Name	DS_AMIX_Routing	
Nucleus Number	1901	
Description	This nucleus performs the routing of the audio signals in the set. It sets the audio path according to the user input.	
Technical	<ul style="list-style-type: none"> - Determine whether the set is of type NAFTA-APAC or EUROPE - Parse the user input to determine the routing - According to parameters set the sound processor and multiplexers 	
Execution Time	Less than 1 second.	
User Input	The user inputs the path ID of his/her choice, as specified in tables below for Europe/NAFTA	
Error	Number	Description
	190100	Routing the audio path succeeded
	190101	Routing the audio path failed
	190102	There was an error resetting the sound processor
	190103	The user provided wrong input
	190104	There was no response from the ASP
Example	DS:> 1901 00 190100: Test OK @	

Table 5-5 Available AUDIO path-Ids for EUROPE routing

EURO Path ID	Description
	(DbOut=Digital Board Output, Dbln = Digital Board Input)
00	DbOut to All Outs.
01	- DbOut to RearOut for CVBS/YC, and RearOut for YUV. - FrontIn to Dbln.
02	- DbOut to Scart_1-AOut. - Scart_2-AIn to Dbln.
03	- DbOut to Scart_2-AOut. - Scart_1-AIn to Dbln.
04	- DbOut to RearOut for CVBS/YC. - Tuner to Dbln.
05	DbOut to RearOut-5.1.
06	DbOut to Dbln
07	Scart_2-AIn to Scart_1-AOut.
08	Scart_1-AIn to Scart_2-AOut.

Table 5-6 Available AUDIO path-Ids for NAFTA/APAC routing

NAFTA Path ID	Description
	(DbOut=Digital Board Output, Dbln = Digital Board Input)
00	DbOut to All Outputs.
01	- DbOut to RearOut for CVBS/YC, and RearOut for YUV. - FrontIn to Dbln.
02	- DbOut to RearOut for CVBS/YC, and RearOut for YUV. - RearIn1 (EXT2) for CVBS/YC to Dbln.
03	- DbOut to RearOut for CVBS/YC, and RearOut for YUV. - RearIn2 (EXT1) for YUV to Dbln.
04	- DbOut to RearOut for CVBS/YC, and RearOut for YUV. - Tuner to Dbln.
05	DbOut to RearOut-5.1.
06	DbOut to Dbln.

Nucleus Name	DS_AMIX_VersionGet
Nucleus Number	1902
Description	This nucleus gets the version information from the sound processor.
Technical	Read the information from the sound processor using IIC
Execution Time	Less than 1 second
User Input	-

Error	Number	Description
	190200	Getting the version info from the sound processor succeeded
	190201	Getting the version info from the sound processor failed
Example	DS:> 1902 Hardware Version:0x 2, Revision Code :0x 7 MSP Product Code:0x19, ROM Version Code:0x48 190200: Test OK @	

Nucleus Name	DS_AMIX_Control	
Nucleus Number	1903	
Description	Test the controllability of the sound processor by performing a controlled reset	
Technical	Test the control register, contains 0x80 after reset and 0x0 after first read of this control register. MSP is reset and the control register is tested for the 0x80 reset indication	
Execution Time	1 second	
User Input	-	
Error	Number	Description
	190300	Testing the controllability succeeded
	190301	Accessing the MSP failed
	190302	Accessing the MSP succeeded, but wrong data was returned
Example	DS:> 1903 190300: Test OK @	

Note	European sets only !!	
Nucleus Name	DS_AMIX_Beep	
Nucleus Number	1904	
Description	Test the beeper functionality of the sound processor	
Technical	-	
Execution Time	3 seconds	
User Input	-	
Error	Number	Description
	190400	Testing the beeper succeeded
	190401	Testing the beeper failed
	190402	There was an error routing the test path
	190402	The user provided the wrong input
Example	DS:> 1904 ON 190400: Test OK @	

Nucleus Name	DS_AMIX_CommunicationAdcDac	
Nucleus Number	1906	
Description	This nucleus checks the communication between the IIC controller of the Codec and the ADC/DAC chip (UDA 1380) on the analogue board	
Technical	Test whether anything can be read from the ADC/DAC	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	190600	Communicating with the ADC/DAC succeeded
	190601	The IIC bus was not accessible
	190602	There was a timeout reading the device
	190603	The IIC acknowledge was not received
	190604	An IIC-bus error occurred
	190605	Got unknown IIC bus error
	190606	The IIC bus initialisation failed
Example	DS:> 1906 190600: Test OK @	

Nucleus Name	DS_AMIX_Mute	
Nucleus Number	1907	
Description	Set or unset the master mute of the ADC/DAC chip (UDA 1380) on the analogue board	

Technical	Send the master mute command via IIC	
Execution Time	Less than 1 second.	
User Input	'ON' or 'OFF'	
Error	Number	Description
	190700	Muting the sound processor succeeded
	190701	Muting sound processor failed
Example	DS:> 1907 190700: Test OK @	

FRONTEND TUNER (FRE)

Nucleus Name	DS_FRE_Communication	
Nucleus Number	2000	
Description	This nucleus checks the communication between the IIC controller of the Codec and the Front End (Tuner) on the analogue board	
Technical	Determine whether anything can be read from the FRE through IIC	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	200000	Communicating with the front end succeeded
	200001	The IIC bus was not accessible
	200002	There was a timeout reading the device
	200003	The IIC acknowledge was not received
	200004	An IIC-bus error occurred
	200005	Got unknown IIC bus error
	200006	The IIC bus initialisation failed
Example	DS:> 2000 200000: Test OK @	

Nucleus Name	DS_FRE_ChannelSelect																																																														
Nucleus Number	2001																																																														
Description	This nucleus sets the tuner to receive a valid audio and video signal																																																														
Technical	-Parse the user input to determine all parameters to set -Pass these parameters to the respective parts using IIC																																																														
Execution Time	Less than 1 second																																																														
User Input	<p><Frequency*16> <video standard id> <Tuner></p> <p>Tuner frequency: to tune the tuner to e.g. 216 MHz, this parameter must be 3456. (Since 216*16 = 3456. This is to avoid the decimal points to the parameter list.)</p> <table><tr><td>Name</td><td>Colour system</td><td>Transmission standard</td><td>Sound modulation</td></tr><tr><td>PAL_BG_S</td><td>PAL</td><td>BG</td><td>FM-Stereo</td></tr><tr><td>PAL_BG_M</td><td>PAL</td><td>BG</td><td>FM-Mono / NICAM</td></tr><tr><td>PAL_I_M</td><td>PAL</td><td>I</td><td>FM-Mono / NICAM</td></tr><tr><td>PAL_DK_S</td><td>PAL</td><td>DK</td><td>FM-Stereo</td></tr><tr><td>PAL_DK_M</td><td>PAL</td><td>DK</td><td>FM-Mono / NICAM</td></tr><tr><td>NTSC_M_S</td><td>NTSC</td><td>M</td><td>FM-Stereo</td></tr></table> <p>Video Standard ID: The table below shows which video standards are possible</p> <table><tr><td>ID</td><td>Europe</td><td>NAFTA / APAC</td></tr><tr><td>0</td><td>PAL_BG_S</td><td>NTSC</td></tr><tr><td>1</td><td>PAL_BG_M</td><td>Invalid</td></tr><tr><td>2</td><td>PAL_I_M</td><td>Invalid</td></tr><tr><td>3</td><td>PAL_DK_S</td><td>Invalid</td></tr><tr><td>4</td><td>PAL_DK_M</td><td>Invalid</td></tr></table> <p>Tuner: Select the tuner type that you want to tune. This input is not mandatory. (If no input is detected, tuner will be defined run-time (if recognised).)</p> <table><tr><td>Tuner</td><td>Tuner ID</td></tr><tr><td>1</td><td>FE1316 (Europe Philips)</td></tr><tr><td>2</td><td>FE1319 (Europe Philips)</td></tr><tr><td>3</td><td>TMQZ2-403A (Europe ALPS)</td></tr><tr><td>4</td><td>JS6B2-L121 (Europe Xuguang)</td></tr><tr><td>5</td><td>TCPK0601 (APAC Samsung)</td></tr><tr><td>6</td><td>TCMN0682 (NAFTA Samsung)</td></tr></table>			Name	Colour system	Transmission standard	Sound modulation	PAL_BG_S	PAL	BG	FM-Stereo	PAL_BG_M	PAL	BG	FM-Mono / NICAM	PAL_I_M	PAL	I	FM-Mono / NICAM	PAL_DK_S	PAL	DK	FM-Stereo	PAL_DK_M	PAL	DK	FM-Mono / NICAM	NTSC_M_S	NTSC	M	FM-Stereo	ID	Europe	NAFTA / APAC	0	PAL_BG_S	NTSC	1	PAL_BG_M	Invalid	2	PAL_I_M	Invalid	3	PAL_DK_S	Invalid	4	PAL_DK_M	Invalid	Tuner	Tuner ID	1	FE1316 (Europe Philips)	2	FE1319 (Europe Philips)	3	TMQZ2-403A (Europe ALPS)	4	JS6B2-L121 (Europe Xuguang)	5	TCPK0601 (APAC Samsung)	6	TCMN0682 (NAFTA Samsung)
Name	Colour system	Transmission standard	Sound modulation																																																												
PAL_BG_S	PAL	BG	FM-Stereo																																																												
PAL_BG_M	PAL	BG	FM-Mono / NICAM																																																												
PAL_I_M	PAL	I	FM-Mono / NICAM																																																												
PAL_DK_S	PAL	DK	FM-Stereo																																																												
PAL_DK_M	PAL	DK	FM-Mono / NICAM																																																												
NTSC_M_S	NTSC	M	FM-Stereo																																																												
ID	Europe	NAFTA / APAC																																																													
0	PAL_BG_S	NTSC																																																													
1	PAL_BG_M	Invalid																																																													
2	PAL_I_M	Invalid																																																													
3	PAL_DK_S	Invalid																																																													
4	PAL_DK_M	Invalid																																																													
Tuner	Tuner ID																																																														
1	FE1316 (Europe Philips)																																																														
2	FE1319 (Europe Philips)																																																														
3	TMQZ2-403A (Europe ALPS)																																																														
4	JS6B2-L121 (Europe Xuguang)																																																														
5	TCPK0601 (APAC Samsung)																																																														
6	TCMN0682 (NAFTA Samsung)																																																														
Error	Number	Description																																																													
	200100	Setting the tuner channel succeeded																																																													
	200101	Invalid user input																																																													

Nucleus Name	DS_FRE_ChannelSelect	
	200102	Getting the version of the set failed
	200103	Configuration of the tuner failed
	200104	Configuration of the IF module failed
Example	DS:> 2001 3456 0 1200100: Test OK @	

Nucleus Name	DS_FRE_AFCReferenceVoltage	
Nucleus Number	2002	
Description	This nucleus stores the reference voltage for the tuner in the factory settings	
Technical	<ul style="list-style-type: none"> - Parse the user input - Initialise IIC and NVRAM-connection - Put the new values in NVRAM 	
Execution Time	Less than 1 second.	
User Input	The reference voltage to store, in a range between 0 and 255. (dec.)	
Error	Number	Description
	200200	Storing the reference voltage for the tuner succeeded
	200201	The user provided wrong input
	200202	The section in NVRAM could not be validated after write
	200203	Writing the value to NVRAM failed
	200204	Initialisation of IIC failed or NVRAM unreachable
Example	DS:> 2002 0xaa 200200: Test OK @	

Note	European sets only!!	
Nucleus Name	DS_FRE_CommunicationIfModule	
Nucleus Number	2003	
Description	This nucleus checks the communication with the IF(Intermediate Frequency) module of the front end	
Technical	Determine whether the IF module can be read through IIC	
Execution Time	Less than 1 second	
User Input	-	
Error	Number	Description
	200300	Communicating with the front end succeeded
	200301	The IIC bus was not accessible
	200302	There was a timeout reading the device
	200303	The IIC acknowledge was not received
	200304	An IIC-bus error occurred
	200305	Got unknown IIC bus error
	200306	The IIC bus initialisation failed
	200307	Not a Europe set
Example	DS:> 2003 200300: Test OK @	

Nucleus Name	DS_FRE_TunerTypeGet	
Nucleus Number	2004	
Description	This nucleus retrieves the tuner type information and translates this to the region involved as well.	
Technical	<ul style="list-style-type: none"> - Check the region through the ASP - Read out the tuner type through IIC 	
Execution Time	Less than 1 second	
User Input	-	
Error	Number	Description
	200400	Getting the tuner type information succeeded
	200401	Getting the type of the tuner OK, but unknown type returned
	200402	Getting the tuner type information failed
Example	DS:> 2004 200400: NAFTA Tuner: TCMN0682 Test OK @	

SCRIPT

Nucleus Name	DS_IH_ScriptHandler
Nucleus Number	Script
Description	The test requires no user interaction. A number of nuclei will be run before a message is returned indicating if there is a failure in the DVD Recorder. When a nucleus failed, the script stops and displays the message " FAIL ". Otherwise it displays " PASS " at the end when all nuclei are executed. During the execution of a script, a progress indicator is displayed on the display of the DVD Recorder.
Technical	Execute the included nuclei one by one. If a nucleus fails quit and display the failed nucleus on the local display and service port
Execution Time	16 seconds
Included tests:	<ol style="list-style-type: none"> 1. DS_ANAB_COMMUNICATIONECHO_NUC 2. DS_DCB_COMMUNICATIONECHO_NUC 3. DS_BROM_COMMUNICATION_NUC 4. DS_SYS_SETTINGSDISPLAY_NUC 5. DS_CHR_DEVTYPEGET_NUC 6. DS_CHR_INT_PIC_NUC 7. DS_CHR_DMA_NUC 8. DS_BROM_WRITEREAD_NUC 9. DS_NVRAM_COMMUNICATION_NUC 10. DS_NVRAM_WRITEREAD_NUC 11. DS_SDRAM_WRITEREADFAST_NUC 12. DS_FLASH_WRITEREAD_NUC 13. DS_FLASH_CHECKSUMPROGRAM_NUC 14. DS_SYS_HARDWAREVERSIONGET_NUC 15. DS_VIP_DEVTYPEGET_NUC 16. DS_VIP_COMMUNICATION_NUC 17. DS_DVIO_LINKDEVTYPEGET_NUC 18. DS_DVIO_PHYDEVTYPEGET_NUC 19. DS_DVIO_LINKCOMMUNICATION_NUC 20. DS_DVIO_PHYCOMMUNICATION_NUC 21. DS_PSCAN_COMMUNICATIONDENC_NUC 22. DS_PSCAN_COMMUNICATIONDEINTERLACER_NUC 23. DS_BE_COMMUNICATIONECHO_NUC 24. DS_ANAB_COMMUNICATIONIICNVRAM_NUC 25. DS_ANAB_COMMUNICATIONIICTUNER_NUC 26. DS_ANAB_COMMUNICATIONIICSOUNDPROCESSOR_NUC 27. DS_ANAB_COMMUNICATIONIICAVSELECTOR_NUC 28. DS_ANAB_CHECKSUMPROGRAM_NUC
Note!	Invocation by holding down the PLAY button when powering up the system
Note!	The following example is for a generation 2.1 DVD+RW recorder. The variant you test may behave differently. For a detailed description of the script-behaviour of your variant under test refer to the [RW2_1_SWA_DS].
Example	<pre> DS:> script Executing User/Dealer script. Busy executing NUC1100 1-28 Hello Analogue Board Busy executing NUC1000 2-28 Busy executing NUC200 3-28 Busy executing NUC1228 4-28 Settings ID: 4C4541440D00000000030300010101020101000020080000 Board name: LEAD Hardware ID: 0 Codec IC: PNX7100_MF3 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC: ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: available IDE connector 1: available IDE connector 2: not available PCI connector: not available RAM size 32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH) Not available Bit Engine: AV 2.0 </pre>

Example	<p> Busy executing NUC100 5-28 Device ID 7100 Codec ID PNX7100_MF3 F-BCU (0x0102) 1.0 INTC (0x011d) 1.0 PCI-XIO(0x0113) 1.0 SIF (0x013b) 1.0 EJTAG (0x0104) 0.0 S-BCU (0x0102) 1.0 BOOT (0x010a) 1.0 CONFIG (0x013f) 1.0 RESET (0x0123) 1.0 DEBUG (0x0116) 0.0 UART0 (0x0107) 0.1 UART1 (0x0107) 0.1 UART2 (0x0107) 0.1 UART3 (0x0107) 0.1 I2C0 (0x0105) 0.1 I2C1 (0x0105) 0.1 GPIO (0x013c) 1.0 SYNC (0x013a) 1.0 DISP0 (0xa015) 0.2 DISP1 (0xa00f) 0.0 OSD (0x0136) 0.1 SPU (0xa00e) 0.0 MIXER (0x0137) 1.0 DENC (0x0138) 0.1 CCIR (0x0139) 1.0 VDEC (0x0133) 0.1 PARSE (0xa00d) 0.0 DV (0xa00c) 0.0 BEI (0xa00a) 0.0 IDE (0xa009) 0.0 SGDX (0xa008) 0.0 BYTE (0xa00b) 0.0 OUTPUT (0xa003) 0.0 ACOMP (0xa000) 0.0 VFE (0xa001) 0.0 VCOMP (0xa002) 0.0 SCR (0x0000) 0.0 SIFF (0xa011) 0.0 WMD (0xa010) 0.0 AUDIO0 (0xa015) 0.2 AUDIO1 (0xa00f) 0.0 PSCAN (0xa018) 0.0 </p> <p> Busy executing NUC114 6-28 Busy executing NUC115 7-28 Busy executing NUC201 8-28 Busy executing NUC300 9-28 Busy executing NUC301 10-28 Busy executing NUC401 11-28 Busy executing NUC501 12-28 Busy executing NUC503 13-28 BootCode checksum is: 0xBABEB432, which is correct Diagnostics checksum is: 0xBABED22B, which is correct Download checksum is: 0xBABE025F, which is correct Application checksum is: 0xBABE2825, which is correct </p> <p> Busy executing NUC1200 14-28 Hardware ID = 00 Busy executing NUC600 15-28 Found SAA7118 Busy executing NUC601 16-28 Busy executing NUC700 17-28 Device type of the link layer IC: ffc00301 Busy executing NUC701 18-28 Device type of the phy layer IC: 0 Busy executing NUC702 19-28 Busy executing NUC703 20-28 Busy executing NUC801 21-28 Busy executing NUC808 22-28 The IIC acknowledge was not received, which is correct Busy executing NUC900 23-28 Busy executing NUC1101 24-28 Busy executing NUC1102 25-28 Busy executing NUC1104 26-28 Busy executing NUC1105 27-28 Busy executing NUC1111 28-28 BootCode checksum is: 0xBABE6240, which is correct Diagnostics checksum is: 0xBABEDC9A, which is correct Download checksum is: 0xBABEA6B7, which is correct Application checksum is: 0xBABE5968, which is correct </p> <p> PASS DS:> </p>
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5.4 DVD Module Error code

With DSW command 910 the set software can retrieve an overview of all occurred engine errors.

```

DSW: 910
Momentary errors (0-9): 0x21 0x00 0x00 0x20 0x00 0x00 0x00 0x00 0x00 0x00
Cumulative errors (1-9): 0x00 0x00 0x20 0x00 0x00 0x00 0x00 0x00 0x00
Software fatal assert : 256 cpowermanager.cpp
091000:
Test OK @
DSW: _
  
```

5.4.1 Momentary Errors

Byte 0: latest error:

Overview of the BE error codes.

error code	error	meaning
0x00	no_error	No error has occurred
0x01	illegal_command_error	Command not allowed in this state or unknown command
0x02	illegal_parameter_error	Parameter(s) not valid for this command
0x03	command_timeout_error	The maximum execution time for the command has exceeded
0x04	sledge_home_error	The sledge could not be moved home
0x05	sledge_calibration_error	An error occurred during calibration of the sledge
0x06	sledge_unstable_error	The sledge detected unstable control
0x07	speed_timeout_error	Spindle motor could not reach its target speed within timeout
0x08	speed_window_error	Measured spinning speed is not within expected window
0x09	focus_timeout_error	Focus could not be achieved within the timeout
0x0A	focus_retries_error	The amount of focus retries expired
0x0B	focus_agc_error	The focus agc results are out of range
0x0C	radial_timeout_error	Servo didn't get on track within the timeout
0x0D	radial_retries_error	Servo didn't get on track after several retries
0x0E	radial_agc_error	The radial agc results are out of range
0x0F	radial_init_error	Unreliable signal scaling after the radial initialisation
0x10	hf_pll_error	HF-decoder pll could not lock to HF signal
0x11	wobble_pll_error	Wobble pll could not lock to wobble signal
0x12	subcode_timeout_error	Subcode information could not be read
0x13	subcode_notfound_error	Requested subcode item could not be found
0x14	header_timeout_error	Header information could not be read
0x15	adip_timeout_error	Adip information could not be read
0x16	adip_window_error	Adip address was not within expected window
0x17	adip_sync_error	No adip sync was detected

error code	error	meaning
0x18	atip_timeout_error	Atip information could not be read
0x19	atip_notfound_error	Requested atip item could not be found
0x1A	atip_window_error	Atip address was not within expected window
0x1B	atip_sync_error	No atip sync was detected
0x1C	tray_error	Tray could not be closed or opened within the timeout
0x1D	seek_error	The requested seek couldn't be performed within the timeout
0x1E	no_hf_present_error	Attempt to read from a blank area
0x1F	record_error	An error occurred during the recording
0x20	illegal_stopaddress_error	The requested stopaddress with modify-stop-address is not valid
0x21	no_disc_error	No disc is detected
0x22	not_initialised_error	The system is not initialised (e.g. seek on unknown disc type)
0x23	illegal_medium_error	BE detected an unsupported medium during disc recognition
0x24	cd_frequency_error	Measured HF frequency is not within CD frequency range
0x25	dvd_frequency_error	Measured HF frequency is not within DVD frequency range
0x26	reserved(non_existing_bca_error)	Attempt to read non-existing bca information
0x27	reserved(bca_read_error)	An error occurred during reading of bca information
0x28	selftest_error	An error occurred during the self-test of the BE
0x29	i2c_error	The I2C interface does not operate
0x2A	laser_pll_error	Laser control pll did not lock or lost lock on write clock
0x2B	laser_forward_sense_error	Forward sense value didn't change with changing laser power
0x2C	jitter_optimisation_error	An error occurred during optimisation of the jitter
0x2D	tilt_calibration_error	An error occurred during calibration of the tilt frame
0x2E	reserved	
0x2F	frontend_offset_calibration_error	The offset in the frontend couldn't be calibrated
0x30	reserved	
0x31	wsg_calculation_error	An error occurred in the calculation of the write strategy
0x32	buffer_overflow_error	The buffer input stream overran the buffer output stream
0x33	return_value_invalid_error	The requested information is not available for this inquiry
0x34	illegal_recording_speed_error	The selected speed is not allowed for a recording on this medium
0x35	opc_media_parameter_error	The media parameters (info in ATIP/ADIP) are invalid or not read
0x36	opc_record_power_error	The final optimum power was not reached
0x37	opc_start_power_low_error	OPC start power too low (optimum power is higher)
0x38	opc_start_power_high_error	OPC start power too high (optimum power is lower)

error code	error	meaning
0x39	opc_power_calculation_error	Error during OPC power calculation (samples are wrong)
0x3A	opc_test_zone_full_error	OPC can't be performed because test zone is full
0x3B	opc_bad_jitter_measurement_error	The jitter measurement during OPC samples readback failed
0x3C	opc_read_samples_error	An error occurred during OPC readback sampling
0x3D	ropc_alpha_overflow_error	The determined value for the optimum power is too high
0x3E	ropc_alpha_ref_current_error	The alpha measurement reference current is wrong (IAN)
0x3F	ropc_alpha_gain_error	The alpha measurement alpha gain is wrong
0x40	beta_over_under_flow_error	During the walking OPC a beta over-/under-flow was detected
0x41	not_enough_calib_points_error	Not enough valid calibration points available for re-calibration
0x42	not_enough_power_error	The calculated power during re-calibration exceeds max power
0x43	illegal_reading_speed_error	The selected speed is not allowed for the requested command
0x44	servo_fatal_error	The actuator dissipation became too high during a servo recovery

This error is overwritten by the next player / inquiry command.

Byte 1 - 9: cumulative errors of previous error occurrences.
Every individual error has its own bit in the 9-byte structure as described in the drawing below:

Format of the BE error bytes.

byte 1

b7	b6	b5	b4	b3	b2	b1	b0
reserved	FOCUS AGC ERROR	FOCUS RETRIES ERROR	FOCUS TIMEOUT ERROR	RADIAL AGC ERROR	RADIAL RETRIES ERROR	RADIAL TIMEOUT ERROR	RADIAL INIT ERROR

byte 2

TRAY ERROR	reserved	JITTER OPTIMIZATION ERROR	SLEDGE HOME ERROR	SLEDGE UNSTABLE ERROR	SLEDGE CALIBRATION ERROR	TILT SENSOR OFFSET CALIBRATION ERROR	TILT CALIBRATION ERROR
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byte 3

RECORD ERROR	SEEK ERROR	NO DISC ERROR	NOT INITIALISED ERROR	ILLEGAL STOPADDRESS ERROR	ILLEGAL PARAMETER ERROR	ILLEGAL COMMAND ERROR	COMMAND TIMEOUT ERROR
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byte 4

SERVO FATAL ERROR	reserved	reserved	HF PLL ERROR	NO HF PRESENT ERROR	HEADER TIMEOUT ERROR	SUBCODE NOTFOUND ERROR	SUBCODE TIMEOUT ERROR
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byte5

WOBBLE PLL ERROR	ADIP SYNC ERROR	ADIP WINDOW ERROR	ADIP TIMEOUT ERROR	ATIP NOTFOUND ERROR	ATIP SYNC ERROR	ATIP WINDOW ERROR	ATIP TIMEOUT ERROR
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byte6

WSG CALCULATION ERROR	DVD FREQUENCY ERROR	CD FREQUENCY ERROR	ILLEGAL RECORDING SPEED ERROR	SPEED WINDOW ERROR	SPEED TIMEOUT ERROR	NON EXISTING BCA ERROR	BCA READ ERROR
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byte7

LASER FORWARD SENSE ERROR	NVRAM CHECKSUM UPDATE ERROR	FRONTEND OFFSET CALIBRATION ERROR	LASER PLL ERROR	ILLEGAL READING SPEED ERROR	ILLEGAL MEDIUM ERROR	SELFTEST ERROR	I ² C ERROR
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byte8

OPC READ SAMPLES ERROR	OPC BAD JITTER MEASUREMENT ERROR	OPC TEST ZONE FULL ERROR	OPC POWER CALCULATION ERROR	OPC START POWER HIGH ERROR	OPC START POWER LOW ERROR	OPC RECORD POWER ERROR	OPC MEDIA PARAMETER ERROR
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byte9

RETURN VALUE INVALID ERROR	BUFFER OVERRUN ERROR	BETA OVER/UNDER FLOW ERROR	NOT ENOUGH CALIB POINTS ERROR	NOT ENOUGH POWER ERROR	ROPC ALPHA GAIN ERROR	ROPC ALPHA REF CURRENT ERROR	ROPC ALPHA OVERFLOW ERROR
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These errors are kept in memory until a power down of the drive (e.g. when recorder goes to standby) or reset of the drive.

5.4.2 Cumulative errors

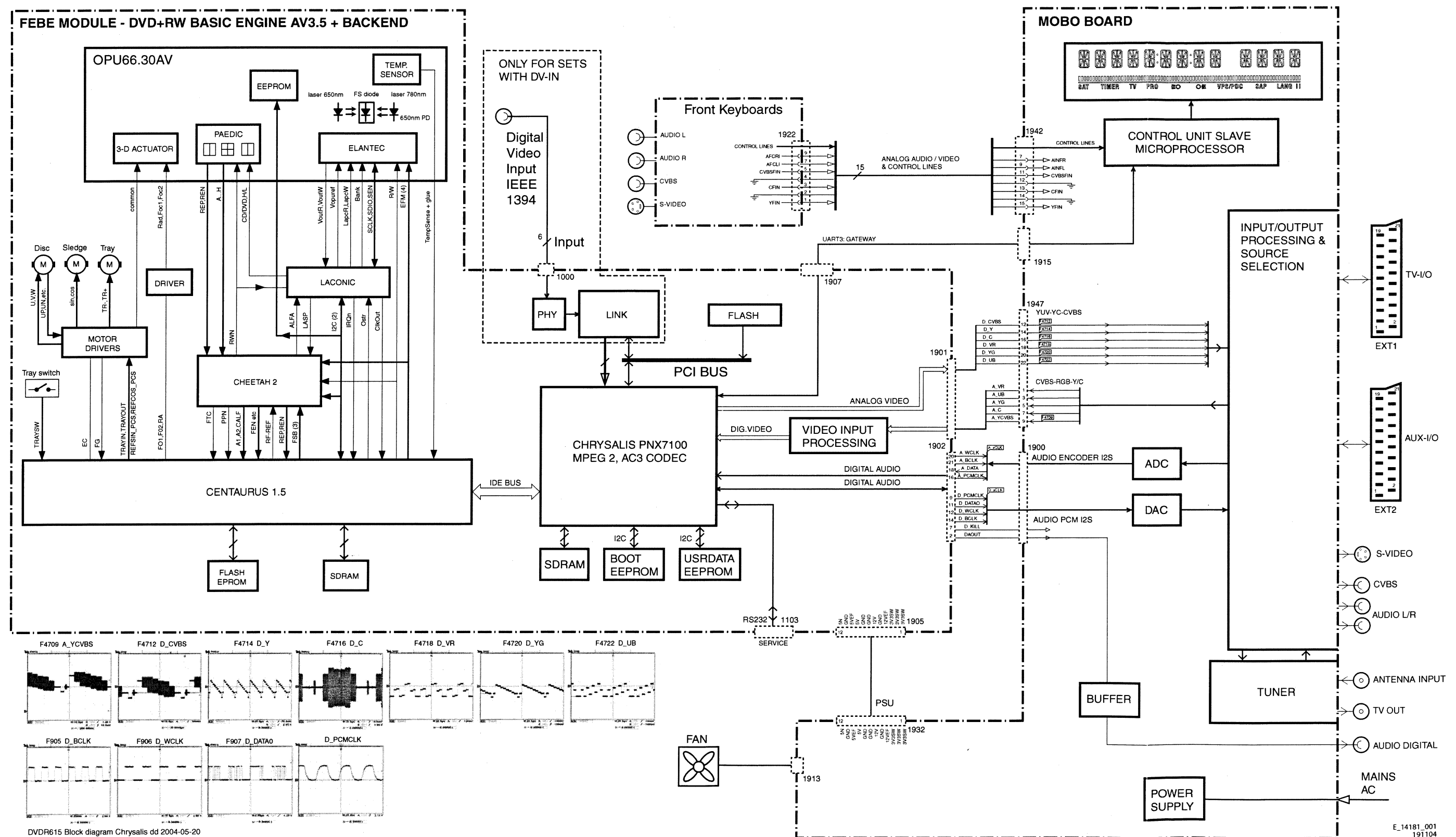
These errors are stored in EEPROM and are thus non-volatile showing the complete error history of the drive.

Byte 1 - 9: cumulative errors of previous player / inquiry error occurrences. These bytes are the same as the nine bytes (1-9) of the Momentary errors

5.4.3 Software fatal assert

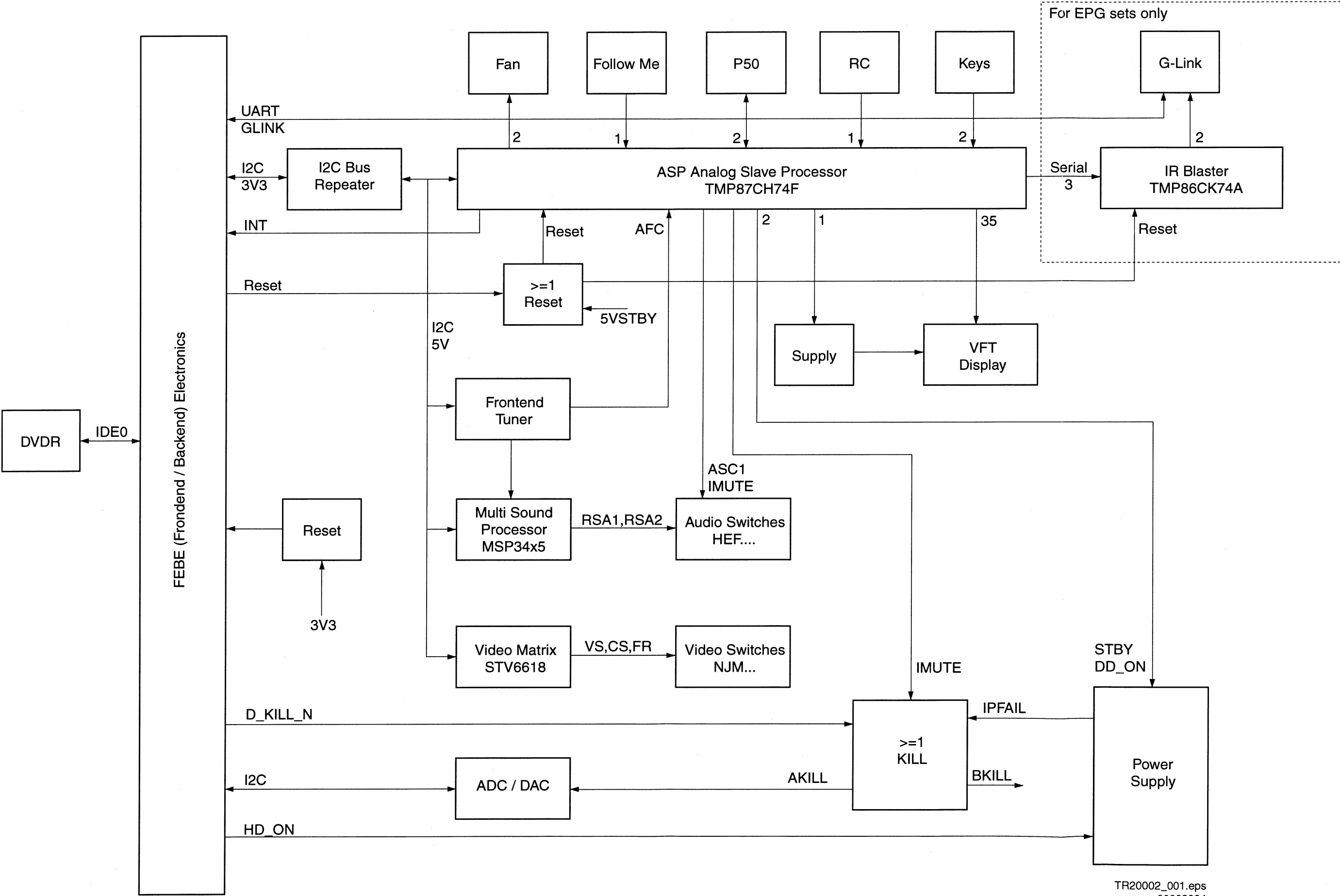
Gives row number and file name in the source code of the firmware of the data path of the AV3

Overall Block Diagram of the Set

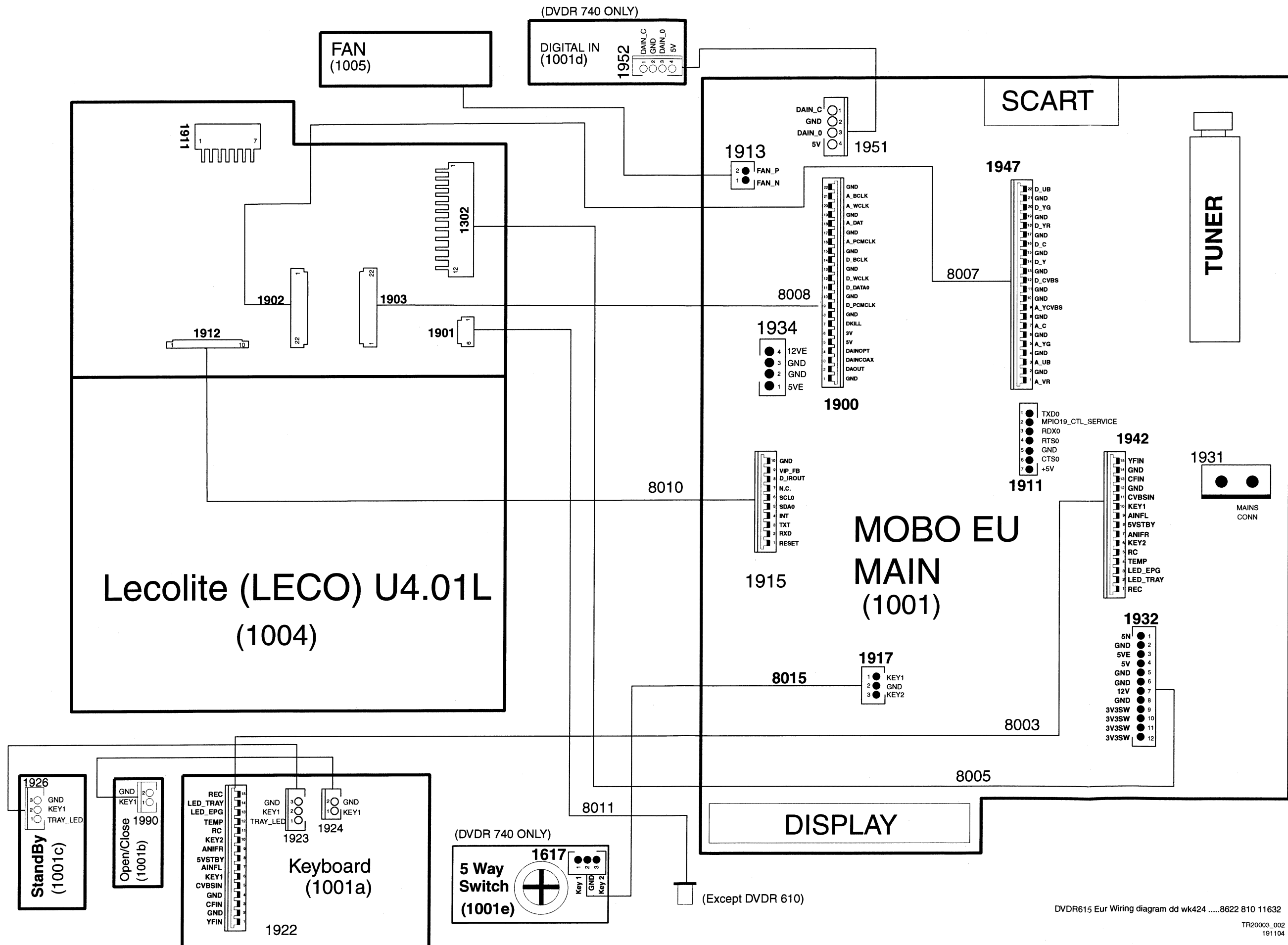


DVDR615 Block diagram Lecolite U4.01L

Control Block Diagram MOBO Board

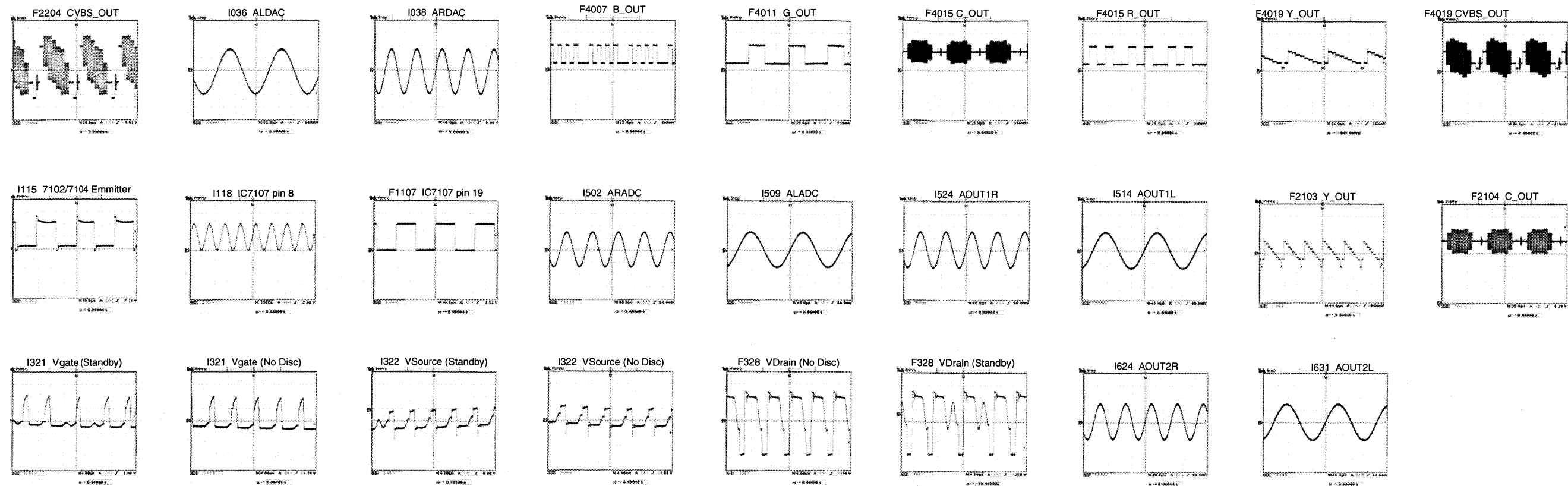


Wiring Diagram LECO

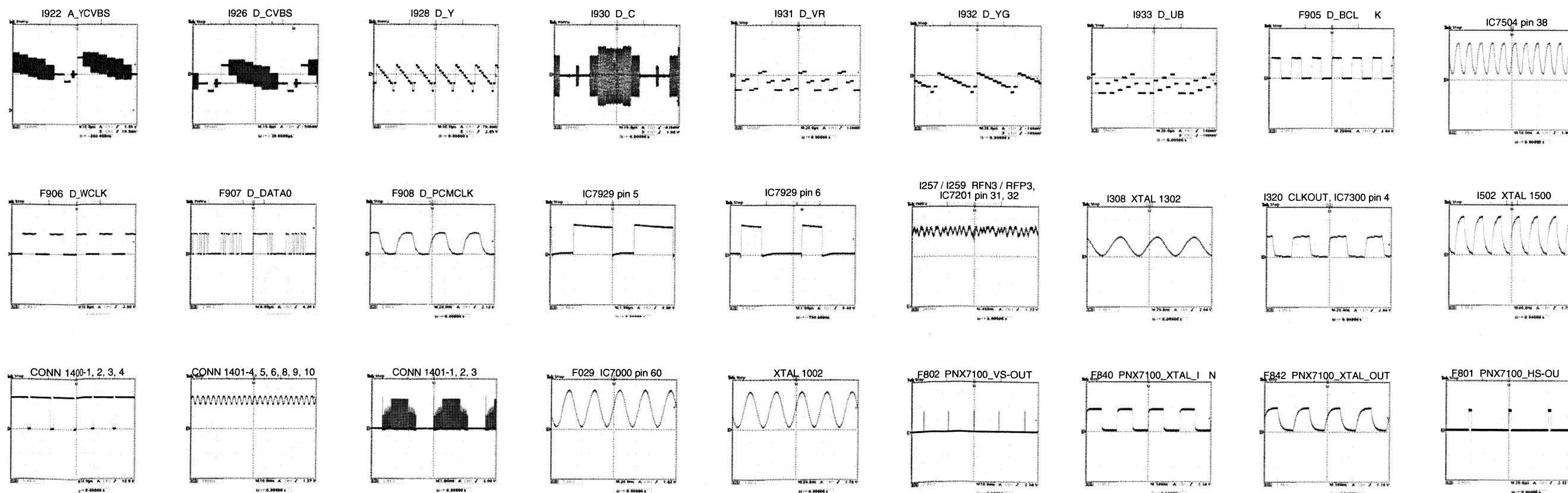


Waveforms

MOBO Board Waveforms

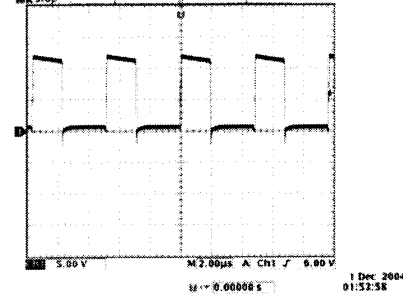


FEBE Board Waveforms

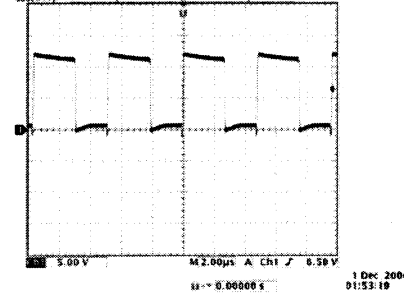


WAVEFORMS Lecolite Board

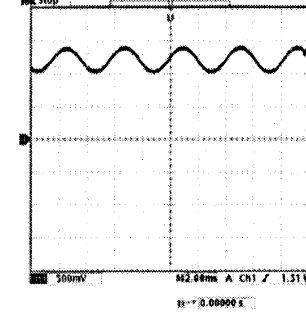
IC7301 pin 5



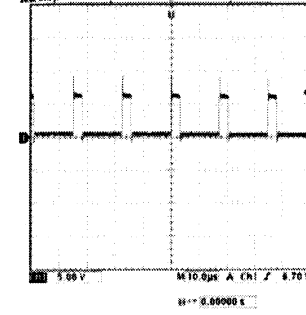
IC7301 pin 6



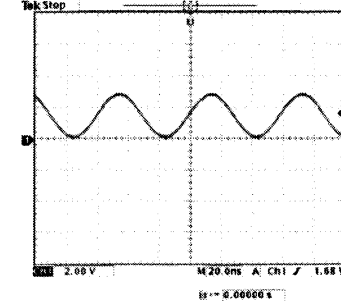
CONN 1401-4,5,6,8,9,10



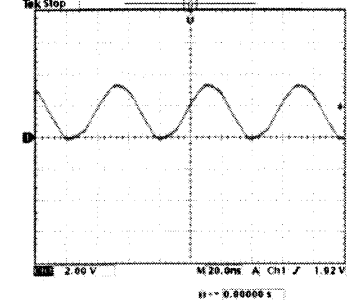
CONN 1401-1,2,3



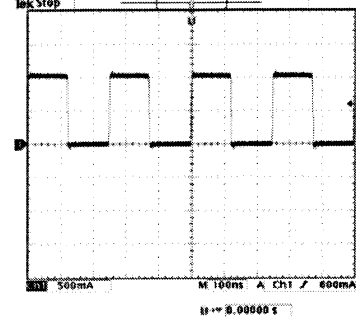
IC 7501-1 XTAL IN I502



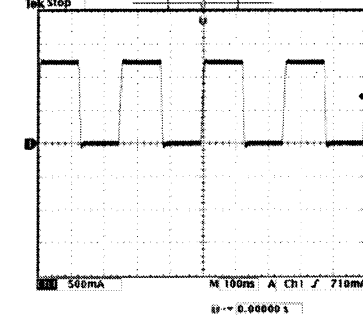
IC 7501-1 XTAL OUT I501



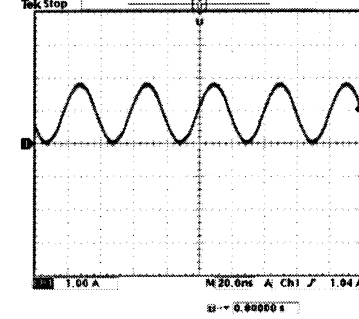
F801 PN_XTAL_IN



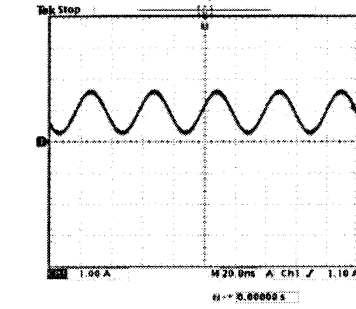
F802 PN_XTAL_OUT



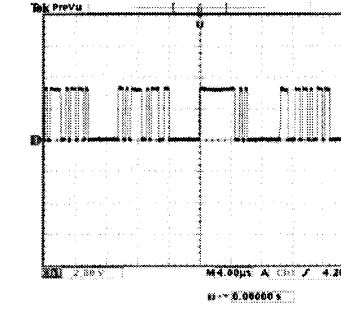
1002 XTAL(2078 side)



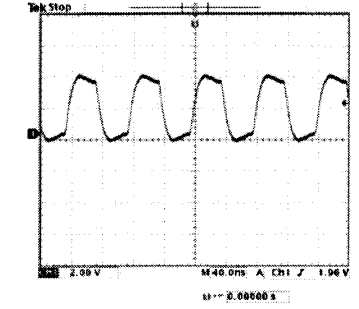
1002 XTAL(2079 side)



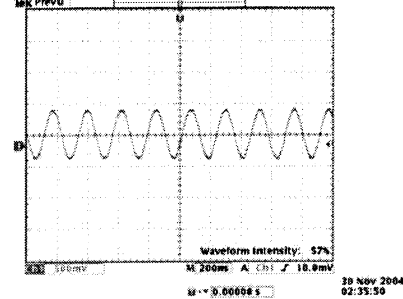
F916 PN_XSDO_OUT



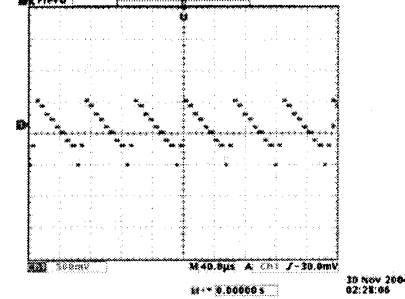
F917 PN_FSCLK_OUT



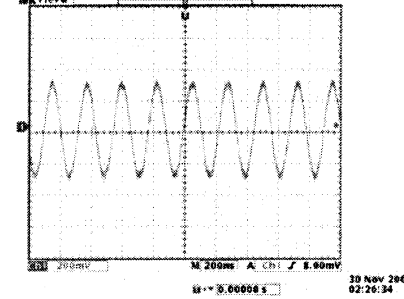
I917 D_CVBS



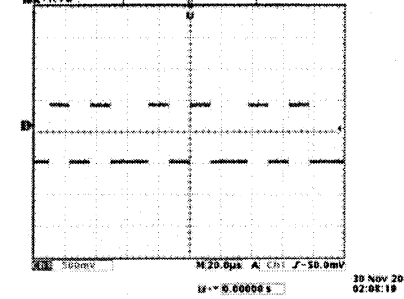
I919 D_Y



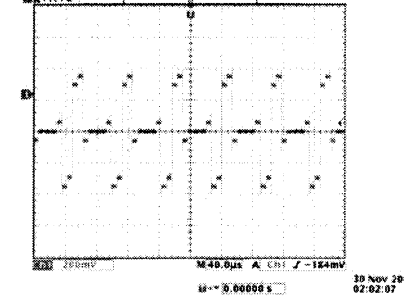
I921 D_C



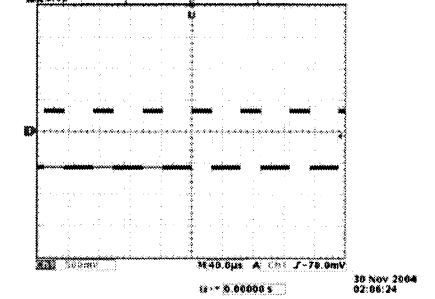
I922 D_V



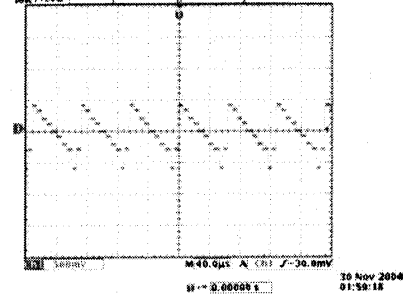
I922 D_R



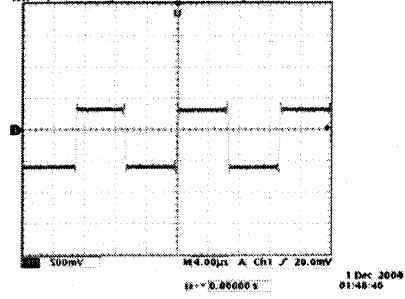
I922D_Y



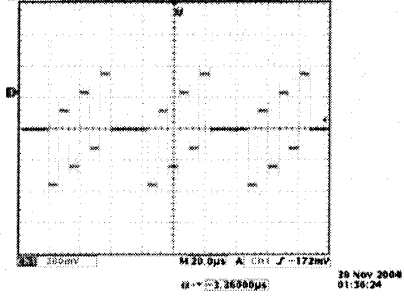
I924 D_G



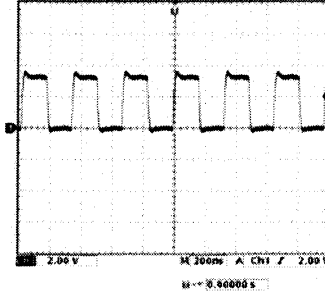
I926 D_U



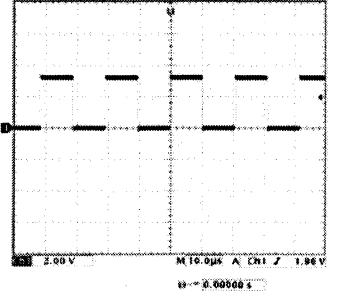
I926D_B



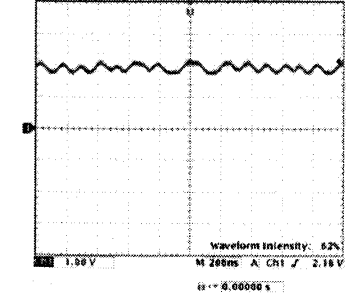
F927 PN_XSCK_OUT



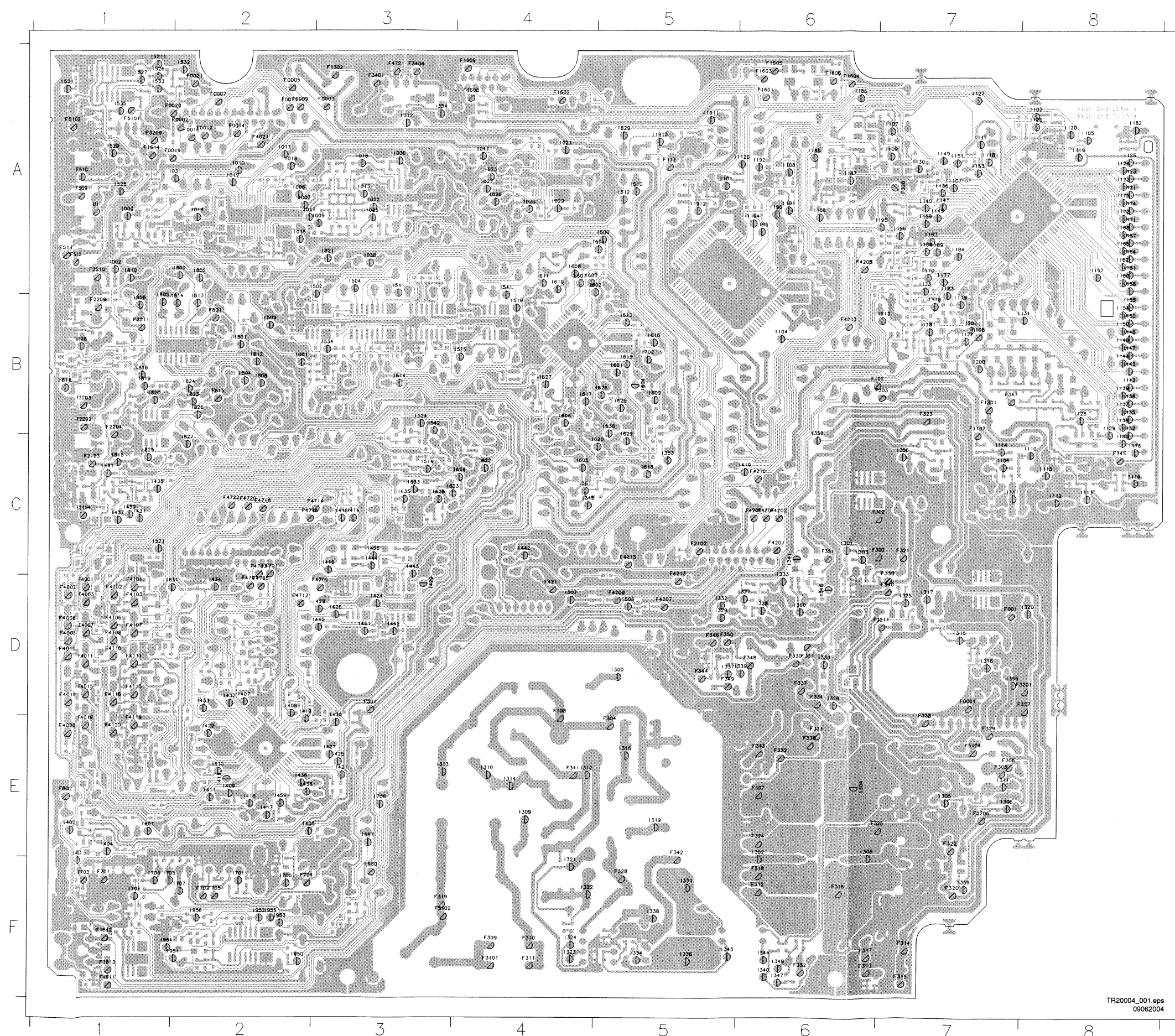
F915 PN_WS_OUT



I257/I259 RFN/RFP, IC7201 pin 32,31

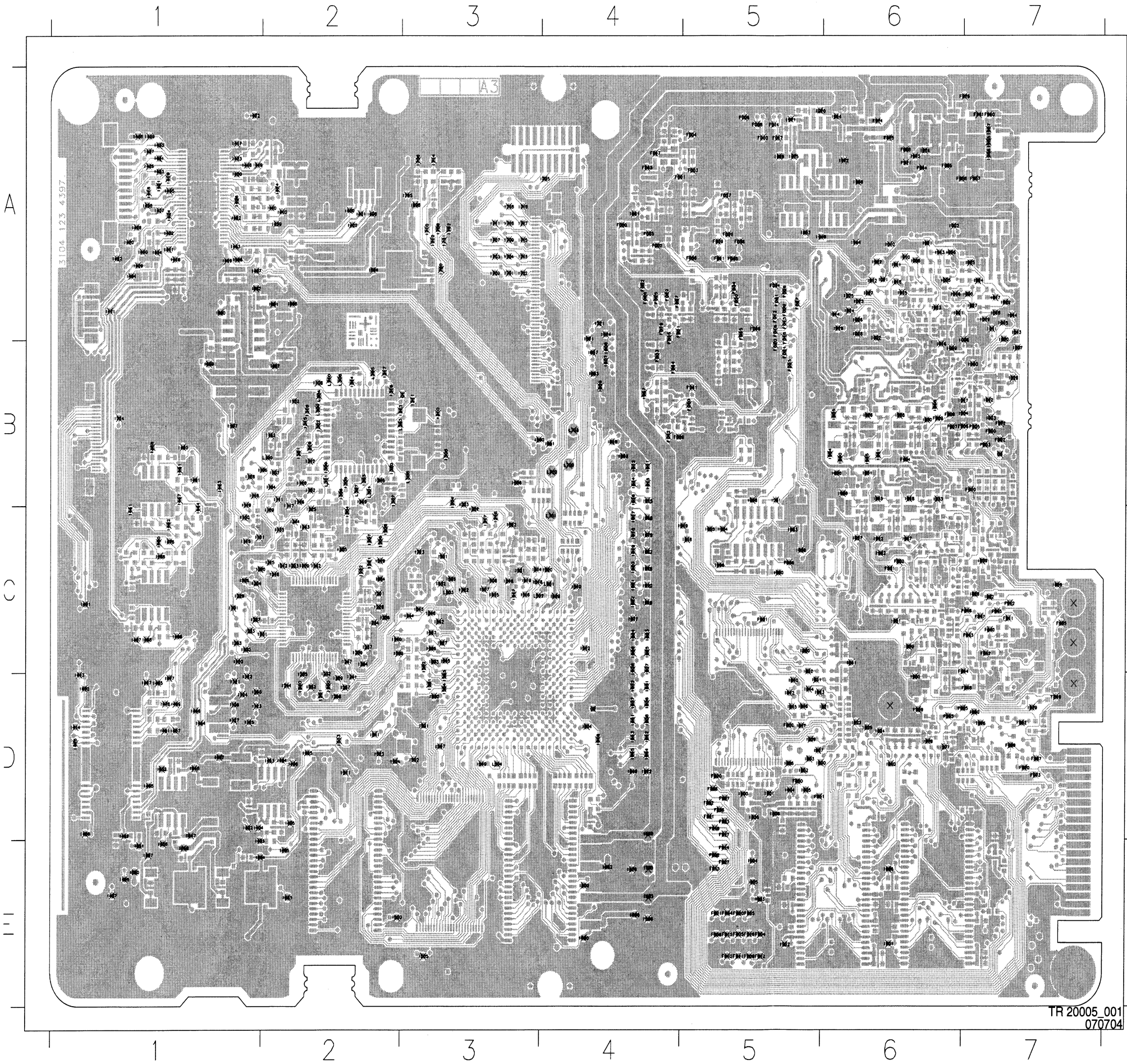


Test points overview MOBO Board



U1	A1	F4003	D1	I1122	B7	I317	D7	I532	A2
F0001	D7	F4006	D1	I1113	C8	I318	E5	I533	A1
F0002	A2	F4007	D1	I1114	C7	I319	E5	I534	B3
F0003	A3	F4008	D1	I1115	C8	I320	D8	I535	A1
F0005	A2	F4010	D1	I1116	C8	I321	F4	I541	A4
F0007	A2	F4011	D1	I1117	A7	I322	F4	I542	B3
F0009	A2	F4015	D1	I1118	A7	I323	F4	I602	A4
F001	D7	F4016	D1	I1119	A8	I324	F4	I603	A4
F0011	A2	F4019	E1	I120	A8	I325	D7	I604	B5
F0012	A2	F4020	E1	I121	A8	I326	D6	I605	C4
F0014	A2	F4021	A2	I122	A8	I327	D6	I606	B4
F0016	A2	F4101	D1	I123	A8	I328	D6	I607	A4
F0019	A1	F4102	D1	I124	A8	I329	D5	I608	A4
F0020	A1	F4103	D1	I125	A8	I330	D6	I609	B5
F0021	A2	F4106	D1	I126	A8	I331	F5	I610	A4
F100	B6	F4107	D1	I127	A7	I332	D5	I611	A4
F108	B7	F4108	D1	I128	B8	I333	C6	I613	B5
F1107	B7	F4110	D1	I129	B8	I334	F5	I614	B3
F111	A5	F4111	D1	I130	A7	I336	F5	I616	B5
F1301	B7	F4115	D1	I131	B8	I337	D5	I617	B4
F1302	A3	F4116	D1	I132	B8	I338	F5	I618	C5
F1601	A6	F4119	E1	I134	B8	I339	D6	I619	B5
F1602	A4	F4120	E1	I135	B8	I340	F6	I620	C5
F1603	A6	F4201	C6	I136	A7	I341	C6	I621	B5
F1604	A6	F4202	C6	I137	B8	I343	F5	I622	C4
F1605	A6	F4203	B6	I138	B8	I344	F6	I623	C3
F1606	A6	F4204	C6	I139	B8	I345	C4	I624	C4
F1608	A4	F4205	A6	I140	A7	I346	D6	I625	B5
F1609	A4	F4206	C6	I141	A7	I347	F6	I626	B5
F1611	F1	F4207	D5	I142	B8	I349	F6	I627	B4
F1612	F1	F4209	D5	I143	B8	I353	C5	I628	C3
F1613	F1	F4210	C6	I144	B8	I354	A3	I629	B5
F1614	A1	F4211	D4	I145	A7	I355	D7	I630	B5
F2102	C5	F4213	C5	I146	B8	I356	C7	I631	D1
F2103	C1	F4215	C5	I147	B8	I358	B6	I633	C3
F2104	C1	F4701	C2	I148	B8	I359	F7	I635	C3
F2202	B1	F4703	C2	I149	A7	I360	D6	I700	F2
F2203	B1	F4705	D2	I150	B8	I361	C4	I701	F2
F2204	B1	F4707	D2	I151	A7	I401	E1	I702	B5
F2209	B1	F4709	D3	I152	B8	I402	E1	I703	F1
F2210	A1	F4712	D2	I153	A7	I403	E1	I704	F1
F2211	B1	F4714	C3	I154	B8	I404	E1	I705	F1
F300	C7	F4716	C2	I155	B8	I405	E2	I706	E3
F301	D3	F4718	C2	I156	A7	I406	C3	I707	F2
F302	C7	F4720	C2	I157	A8	I407	D2	I801	B2
F303	B7	F4721	A3	I158	A8	I408	D2	I802	A2
F304	E5	F4722	C2	I159	A7	I409	E2	I804	B2
F305	E7	F509	A1	I160	A8	I410	C6	I805	B1
F306	E7	F510	A1	I161	A8	I411	E2	I806	B1
F307	E6	F5101	A1	I162	A8	I413	E2	I808	B2
F308	D4	F5102	A1	I163	A7	I414	C3	I809	A2
F309	F4	F5104	E7	I164	A8	I415	E2	I810	A1
F310	F4	F511	A1	I165	A8	I416	C3	I812	B2
F3101	F4	F512	A1	I166	A7	I417	E2	I813	B2
F3102	F3	F701	F1	I167	A8	I418	E2	I814	B2
F311	F4	F702	F2	I168	A8	I419	D2	I815	C1
F312	F6	F703	F1	I169	A7	I421	E3	I816	B1
F313	F6	F704	F2	I170	A7	I422	E2	I818	B1
F314	F7	F705	F2	I171	A8	I424	D3	I819	B1
F315	F7	F801	B2	I172	A8	I425	E3	I820	B1
F316	F6	F802	E1	I173	A7	I426	D3	I821	A3
F317	F6	F815	B2	I174	A8	I427	E3	I823	B2
F318	F6	F950	F3	I175	A8	I428	D3	I824	B2
F319	F3	I000	A1	I176	C8	I429	D3	I825	C1
F320	F7	I001	B2	I177	A7	I430	D3	I826	B2
F3201	D8	I002	A1	I178	B7	I431	C1	I827	C2
F3206	E7	I006	A2	I179	B7	I432	D2	I828	B1
F3209	A1	I007	A2	I180	C8	I433	D2	I829	A5
F321	C7	I009	A3	I181	B7	I434	D2	I950	F2
F3211	D7	I010	A2	I182	A8	I435	C1	I951	F2
F322	E7	I011	A2	I183	A7	I436	E2	I952	F2
F323	B7	I012	A3	I184	A7	I437	C1	I953	F2
F324	E6	I013	A3	I185	A6	I438	E2	I954	F1
F325	E7	I014	A2	I186	A6	I439	C1	I955	F2
F326	A7	I015	A2	I187	A6	I440	D3	I956	F2
F327	D8	I016	A3	I188	A6	I441	C1	I957	E3
F328	F5	I017	A2	I190	A6	I442	C4		
F329	E7	I018	A2	I191	A6	I443	C3		
F330	D6	I019	A2	I1910	A5	I444	C3		
F331	D6	I020	A4	I1911	A5	I445	C3		
F332	E6	I021	A4	I1912	A5	I459	E2		
F333	E6	I022	A3	I1913	B7	I461	D3		
F334	D6	I023	A4	I192	A6	I462	D3		
F336	E6	I025	A3	I193	A6	I500	A5		
F337	D6	I026	A4	I194	A6	I501	A5		
F338	D7	I027	A4	I195	A7	I502	A3		
F339	C7	I029	A4	I200	B7	I504	A3		
F340	D7	I031	A2	I202	B7	I505	D5		
F3401	A3	I036	A3	I300	D5	I507	D4		
F3404	A3	I038	A3	I301	C6	I509	B2		
F341	E4	I041	A4	I302	E6	I510	A5		
F342	E5	I101	A5	I303	C6	I511	A3		
F343	E6	I102	A8	I304	E6	I512	A5		
F344	D5	I104	B6	I305	E7	I514	C3		
F345	C8	I105	A8	I306	E7	I519	B4		
F346	D5	I106	C7	I308	E6	I521	C1		
F347	B7	I107	A7	I309	E4	I5211	A1		
F348	D6	I108	A6	I310	E4	I524	B3		
F349	D5	I109	A7	I311	E7	I525	B4		
F350	D5	I110	C8	I312	E4	I526	A1		
F351	C6	I1107	A7	I313	E3	I527	A1		
F352	F6	I111	C7	I314	E4	I528	A1		
F4001	D1	I112	C8	I315	D7	I529	A1		
F4002	D1	I1120	A6	I316	D7	I531	A1		

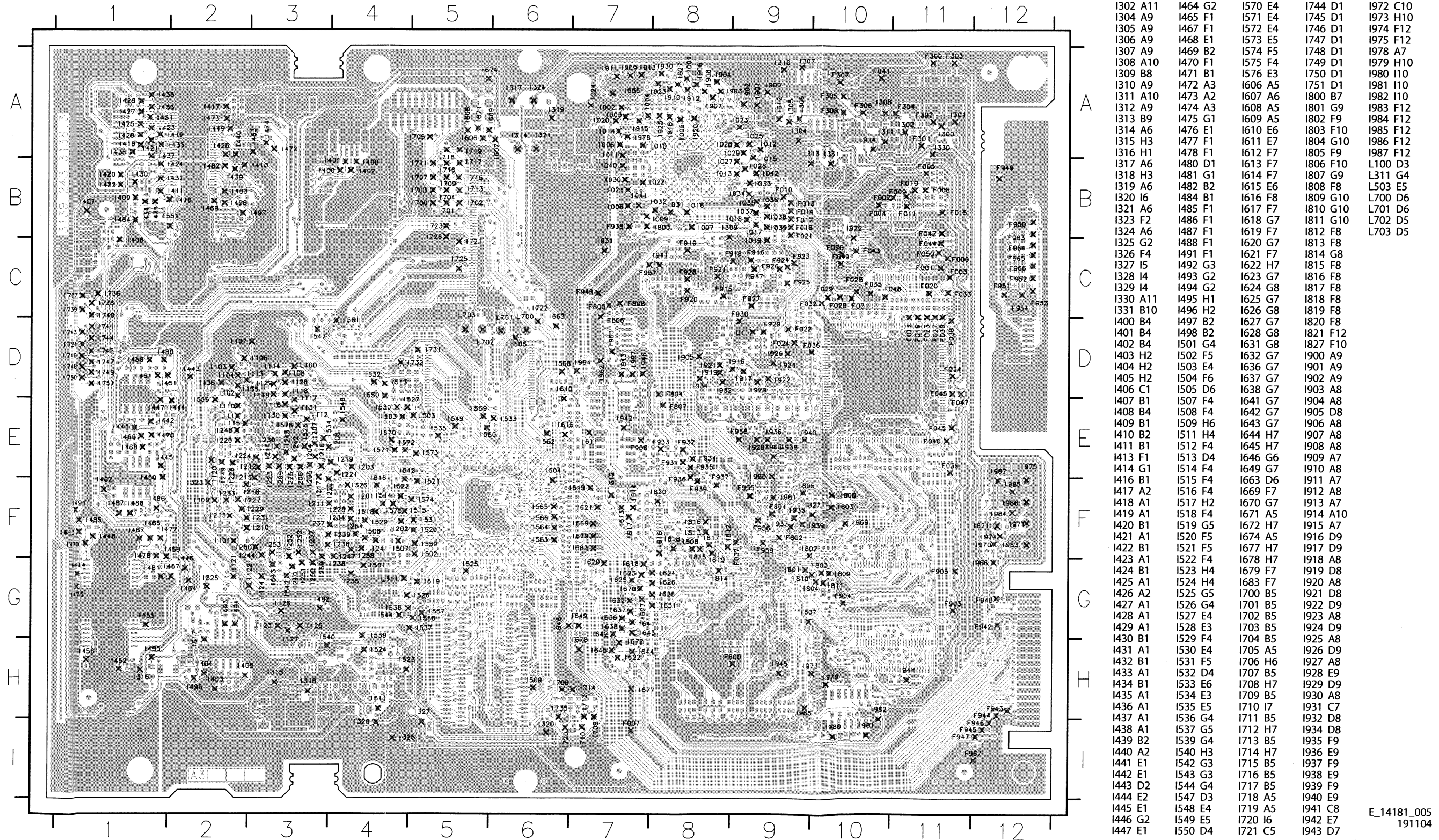
Test points overview FEBE Board



U1 B3	F839 A5	I028 A6	I257 D2	I457 D1	I550 B3	I702 A3	I925 A7
U2 D4	F840 C7	I029 B7	I258 D2	I458 B1	I551 B4	I703 A3	I926 B6
U3 B7	F841 A5	I030 B7	I259 D2	I459 D1	I555 E4	I704 A3	I927 A7
F001 A4	F842 C7	I100 C1	I260 D1	I460 C1	I607 B4	I705 A4	I928 B6
F0010 A4	F843 C7	I101 C1	I261 D3	I461 B1	I608 B4	I706 A3	I929 A7
F002 A4	F844 C7	I102 B2	I262 C3	I463 A1	I609 B4	I707 A3	I930 B6
F003 A5	F845 C7	I103 B2	I263 D3	I464 D1	I610 B4	I708 A3	I931 B6
F004 A5	F846 C7	I104 B2	I264 C2	I465 D1	I611 B4	I709 A3	I932 C6
F005 A4	F847 C7	I106 B2	I300 B2	I467 D1	I612 B4	I710 A3	I933 B6
F006 A5	F848 D7	I107 B1	I301 B2	I468 C1	I613 B4	I711 A3	I934 B6
F007 A4	F849 D7	I108 B2	I302 B2	I469 A1	I614 B4	I712 A3	I935 B6
F008 A5	F850 D5	I110 B2	I303 B2	I470 D1	I615 B4	I713 A3	I936 A6
F009 A5	F851 D5	I111 B2	I304 C2	I471 A1	I616 B4	I714 A3	I937 C6
F010 A5	F900 B7	I115 C1	I305 B2	I472 A1	I617 C4	I715 A3	I938 B6
F011 A4	F901 C5	I116 B2	I306 B2	I473 A1	I618 C4	I716 A3	I939 C7
F012 A5	F902 B7	I117 B2	I307 B2	I474 A2	I619 C4	I717 A3	I940 B6
F013 A5	F903 B7	I118 B1	I308 B3	I475 D1	I620 C4	I718 A3	I941 B6
F014 A5	F904 B6	I119 B1	I310 B3	I476 C1	I621 C4	I719 A3	I942 C6
F015 A4	F905 B7	I120 C1	I311 B3	I477 D1	I622 C4	I720 A3	I943 B6
F016 A5	F906 B6	I121 D1	I312 B2	I478 D1	I623 C4	I721 A4	I944 A6
F017 A5	F907 B6	I122 D1	I313 B2	I480 B1	I624 C4	I722 C3	I945 B6
F018 A5	F908 B6	I123 D1	I314 B2	I481 D1	I625 C4	I723 C3	I946 B6
F019 A4	F909 B6	I124 D1	I315 B2	I482 A1	I626 C4	I724 B1	I947 C6
F020 B5	F910 B7	I125 D1	I316 B2	I484 A1	I627 C4	I731 A3	I948 B6
F021 B5	F911 C7	I126 D1	I317 B2	I485 D2	I628 C4	I732 A3	I949 A5
F022 A4	F912 C7	I127 D1	I318 B2	I486 C1	I629 C4	I735 A3	I950 D6
F023 B5	F935 C7	I128 B1	I319 B2	I487 C1	I631 D4	I800 D5	I951 C6
F024 A5	F950 D7	I129 C2	I320 B2	I488 C1	I632 D4	I801 D5	I953 C5
F025 A4	F951 C7	I130 C1	I400 A2	I491 C1	I633 E2	I802 D5	I954 C5
F026 A5	F952 C7	I131 C1	I401 A2	I492 D1	I634 E1	I803 D5	I955 C5
F027 A5	F954 D6	I132 B2	I402 A2	I493 D2	I636 D4	I804 D5	I956 C5
F028 A4	F956 C5	I133 B2	I403 E1	I494 D2	I637 D4	I805 D5	I957 B4
F029 A5	F957 A7	I135 C2	I404 D1	I495 E2	I638 D4	I806 D5	I958 B5
F030 A5	F958 A6	I201 C2	I405 D2	I496 D2	I641 D4	I807 D5	I959 C7
F031 A5	F959 D6	I202 C3	I406 E1	I497 A1	I642 D4	I808 D5	I960 C5
F032 A4	F960 A7	I203 B3	I407 E1	I498 A1	I643 D4	I809 D5	I961 B5
F033 B4	F961 A7	I204 B3	I408 A2	I500 E2	I644 D4	I810 D5	I962 C7
F034 A5	F962 D7	I205 C2	I409 A1	I501 D3	I645 D4	I811 D5	I963 A5
F035 A5	F963 D6	I206 C2	I410 A2	I502 D3	I646 D4	I812 D5	I964 A6
F036 A5	F964 A6	I207 C2	I411 A1	I503 C3	I647 D1	I813 D5	I965 A7
F037 A5	F965 D7	I208 C2	I413 D1	I504 D4	I648 D1	I814 D5	I966 A7
F038 A5	F966 A6	I209 C2	I414 D1	I505 E3	I649 D4	I815 D5	I967 A7
F039 B4	F967 D7	I212 C2	I416 A1	I506 B3	I650 E1	I816 D5	I968 A6
F040 B5	F968 A6	I214 C2	I417 A1	I507 C3	I651 E1	I817 D5	I969 A5
F041 B5	F969 D7	I215 C2	I418 A1	I508 C3	I652 D1	I818 C5	I970 A5
F042 B4	F970 D7	I216 C3	I419 A1	I509 E4	I653 E4	I819 C5	I971 A5
F043 A4	F971 A6	I217 C3	I420 A1	I510 C4	I654 C2	I820 C5	I972 A6
F044 B4	F972 B7	I218 C2	I421 A1	I511 D2	I656 E1	I821 D6	I973 A6
F045 A5	F973 D7	I219 C2	I422 A1	I512 C4	I657 B4	I822 C5	I974 A6
F046 A5	F974 A6	I220 C1	I423 A1	I513 D2	I658 E1	I823 D6	I975 A5
F047 A4	F975 A6	I221 C2	I424 A1	I514 C3	I659 D4	I824 D6	I976 D7
F800 D5	F976 A7	I222 C2	I425 A1	I515 C3	I662 C4	I825 D6	I977 D6
F801 C6	I001 A6	I223 C2	I426 A1	I516 C3	I663 B4	I826 E6	I978 D6
F802 C6	I0010 A7	I224 C1	I427 A1	I517 C3	I667 E1	I828 C7	I979 D7
F804 E5	I002 A6	I225 C2	I428 A1	I518 C3	I668 C4	I836 D5	I980 D7
F805 E5	I003 B7	I226 C1	I429 A1	I519 C3	I669 C4	I838 C5	L100 B2
F806 E5	I004 B6	I227 C1	I430 A1	I520 C4	I670 C4	I839 C6	L301 B2
F807 E5	I005 A6	I228 C2	I431 A1	I521 C3	I671 A4	I840 D6	L303 B2
F808 E5	I006 B6	I229 C1	I432 A1	I522 C3	I672 D4	I841 C6	L304 B2
F809 E5	I007 B7	I231 C2	I433 A1	I523 D2	I674 A4	I900 D5	L305 B2
F810 E5	I008 A6	I232 D2	I434 A1	I524 D2	I676 E4	I901 E6	L306 B2
F811 E5	I009 B6	I233 C1	I435 A1	I527 C3	I677 C4	I902 E5	L307 B2
F812 E5	I010 A6	I234 C2	I436 A1	I530 D3	I678 C4	I903 E5	L308 B3
F813 E5	I011 A7	I235 D2	I437 A1	I531 C3	I679 C4	I904 E5	L309 B2
F814 E5	I012 B7	I237 C2	I438 A1	I532 C3	I680 E4	I905 E5	L310 B2
F815 E5	I013 A7	I238 C2	I439 A2	I535 C3	I681 A4	I910 A6	L311 B2
F816 E5	I014 A7	I239 C2	I440 A2	I536 C3	I682 E4	I911 A6	L501 C4
F817 D5	I015 A7	I240 D2	I441 C1	I537 C3	I683 B4	I912 A6	L502 C3
F818 D5	I016 A6	I241 D2	I442 C1	I538 E4	I687 B2	I913 A6	L503 C3
F820 D5	I017 B6	I242 C2	I443 B1	I539 C2	I688 A2	I914 A6	L504 D3
F821 E5	I018 A7	I243 C2	I444 C1	I540 C2	I689 B1	I915 A6	L700 B4
F830 E5	I019 A7	I244 D2	I446 D1	I541 D2	I690 A1	I916 B6	L701 C4
F831 D5	I020 A7	I247 C2	I447 B1	I542 C3	I691 A2	I917 A7	L702 B4
F832 D5	I021 A6	I248 B2	I448 A1	I543 C3	I692 A1	I918 A6	L703 B4
F833 D5	I022 A6	I249 B2	I449 A1	I544 C3	I694 A2	I919 A6	
F834 E5	I023 A6	I250 D2	I450 A1	I545 C3	I696 A3	I920 B6	
F835 E5	I024 A6	I251 D2	I451 B1	I546 C3	I697 D1	I921 A6	
F836 D5	I025 A6	I252 D2	I452 D1	I547 D3	I698 E4	I922 A6	
F837 D5	I026 A6	I253 C1	I455 D1	I548 C3	I700 A3	I923 A6	
F838 D5	I027 A6	I254 D3	I456 D1	I549 D3	I701 A3	I924 A7	

Test points overview LECO Board

U1 D9	F014 B9	F028 C10	F042 B11	F305 A10	F904 G10	F927 C9	F942 G12	F956 F9	I006 A7	I020 A7	I034 B9	I106 D2	I121 G2	I202 F4	I216 E3	I230 E3	I244 F3	I448 F1	I551 B2	I722 D6	I944 H11
F001 C11	F015 B11	F029 C10	F043 C10	F306 A10	F905 G11	F928 C8	F943 H12	F957 C7	I007 B8	I021 B7	I035 B9	I107 D3	I122 G3	I203 E4	I217 F3	I231 F2	I247 F4	I449 A2	I555 A7	I723 B5	I945 H9
F002 B11	F016 C11	F030 C11	F044 C11	F307 A10	F906 E7	F929 D9	F944 H12	F958 E9	I008 B7	I022 B7	I036 B9	I108 D3	I123 G3	I204 E3	I218 F2	I232 F3	I248 E2	I450 F1	I556 E2	I724 D1	I946 D7
F003 C11	F017 B9	F031 C10	F045 E11	F308 A10	F915 C8	F930 D9	F945 I12	F959 F9	I009 B7	I023 A9	I037 B9	I110 E2	I124 G3	I205 E3	I219 E4	I233 F2	I249 E2	I451 D1	I557 G5	I725 C5	I960 E9
F004 B10	F018 B9	F032 C10	F046 D11	F800 H9	F916 C9	F931 E8	F946 I12	F963 B12	I010 A7	I024 A7	I038 B9	I111 E2	I125 G3	I206 E3	I220 E2	I234 F4	I250 G3	I452 H1	I558 G5	I726 B5	I961 F9
F005 B11	F019 B11	F033 C11	F047 D11	F801 F9	F917 C9	F932 E8	F947 I12	F964 C12	I011 A7	I025 A9	I039 B9	I112 E3	I126 G3	I207 E3	I221 E4	I235 G4	I251 G3	I453 A3	I559 F5	I731 D5	I962 D7
F006 C11	F020 C11	F034 D11	F048 C10	F802 F9	F918 C9	F933 E8	F948 C7	F965 C12	I012 A9	I026 A9	I040 B7	I113 D2	I127 G3	I208 E3	I222 F3	I236 F4	I252 F3	I455 G1	I560 E5	I732 D4	I963 D7
F007 I7	F021 B9	F035 C10	F049 C10	F803 G10	F919 C8	F934 E8	F949 B12	F966 C12	I013 B9	I027 B9	I041 B7	I114 D3	I128 D3	I209 E3	I223 E3	I237 F4	I253 F3	I456 H1	I561 D4	I735 H6	I964 D7
F008 B11	F022 D9	F036 D9	F050 C11	F804 D8	F920 C8	F935 E8	F950 B12	F967 I12	I014 A7	I028 B9	I042 B9	I115 E2	I129 D3	I210 F2	I224 E3	I238 F3	I257 F3	I457 G2	I562 E6	I736 C1	I965 H9
F009 B11	F023 C11	F037 F9	F300 A11	F805 C7	F921 C8	F936 E8	F951 C12	I001 A8	I015 A9	I029 A9	I100 F2	I116 E3	I130 E3	I211 F3	I225 E3	I239 F3	I258 F4	I458 D1	I563 F6	I737 C1	I966 G12
F010 B9	F024 D9	F038 D11	F301 A11	F806 C7	F923 C9	F937 F8	F952 C12	I002 A7	I016 B8	I030 B7	I101 F2	I117 E3	I131 E3	I212 E3	I226 E2	I240 G3	I259 F3	I459 F1	I564 F6	I738 C1	I967 D7
F011 B11	F025 C10	F039 E11	F302 A11	F807 E8	F924 C9	F938 B7	F953 C12	I003 A7	I017 B9	I031 B8	I102 D2	I118 D3	I135 D2	I213 F2	I227 F2	I241 F4	I260 F3	I460 E1	I565 F6	I739 C1	I968 E9
F012 C11	F026 C10	F040 E11	F303 A11	F808 C7	F925 C9	F939 F8	F954 C12	I004 A7	I018 B9	I032 B8	I103 D2	I119 D3	I136 D2	I214 E3	I228 F4	I242 E3	I264 F4	I461 D1	I566 F6	I740 C1	I969 F10
F013 B9	F027 C11	F041 A10	F304 A11	F903 G11	F926 C9	F940 G12	F955 F9	I005 A8	I019 C9	I033 B9	I104 D2	I120 E2	I201 F4	I215 F3	I229 F2	I243 E3	I300 A11	I462 F1	I568 D6	I741 D1	I970 F12

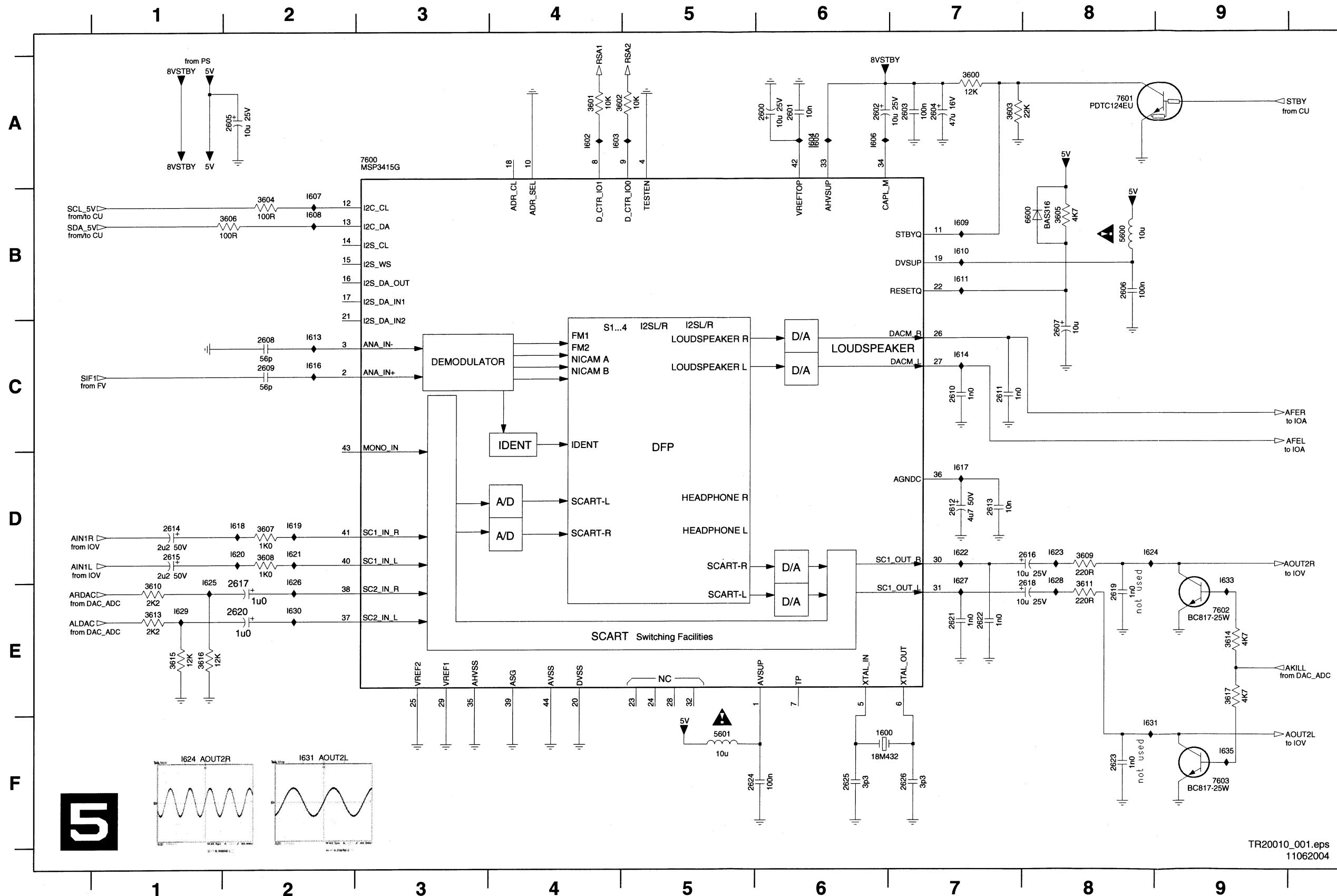


MOBO: Frontend Video (FV)

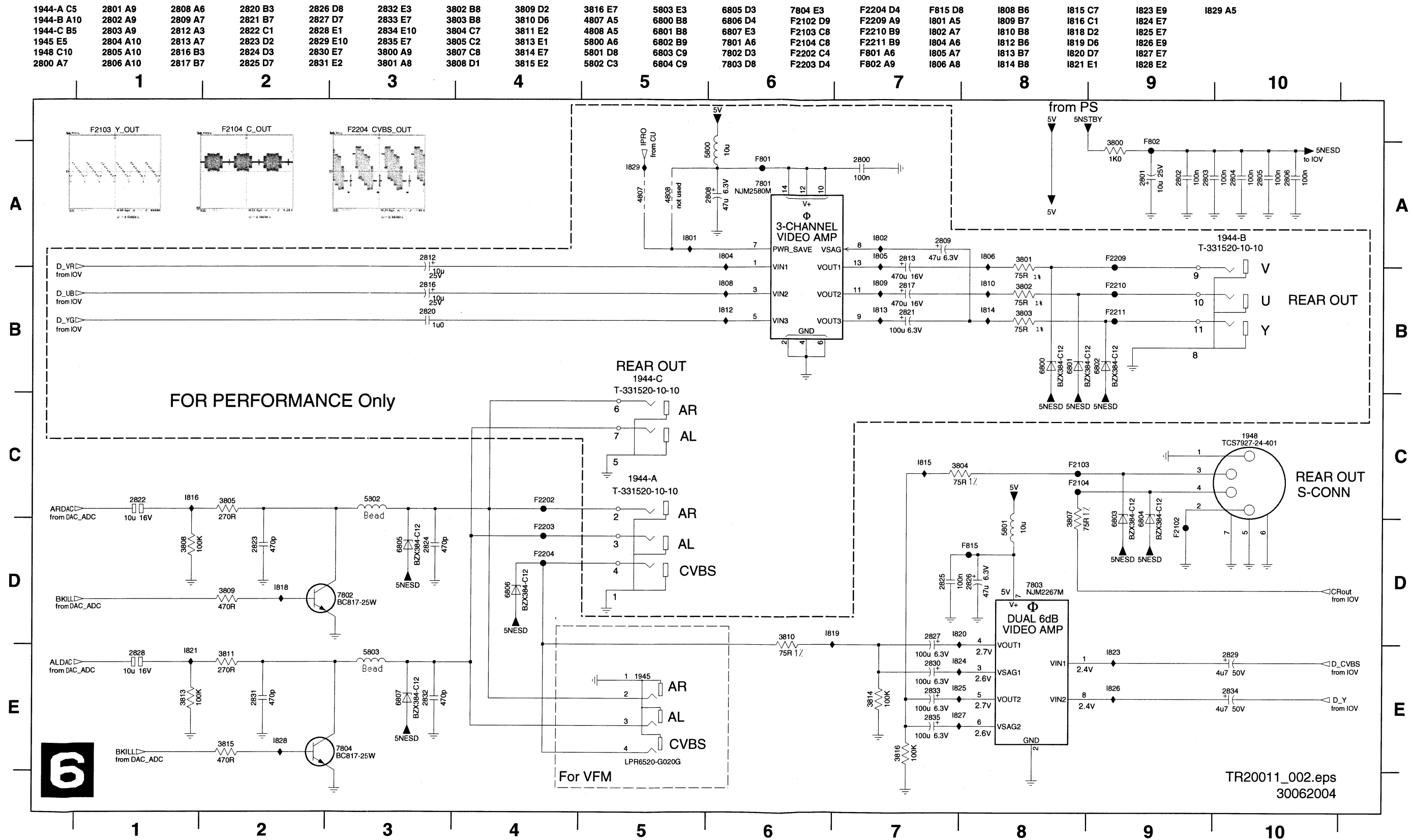
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1940- A7	3465 H3
1940- A13	3466 G14
1940- A9	4001 A9
1942 F1	4401 C8
1947 C14	5402 D9
2401 B3	6401 B4
2402 B2	6402 B5
2403 B2	6403 B5
2404 B2	6404 B5
2405 B4	6405 B4
2406 B6	6406 B5
2407 B7	6407 B6
2408 B7	6408 B9
2409 B8	6409 B10
2410 B8	6410 B11
2411 C1	6411 B11
2412 D8	6412 B12
2413 D8	6413 B13
2414 D8	6414 B14
2415 D3	6415 B14
2416 D8	6416 B4
2417 D9	6417 B11
2418 D9	6418 B5
2419 D7	6419 B7
2420 E2	7401 B5
2421 E2	7402 B8
2422 E10	7402 C12
2423 E10	7402 C12
2424 E10	7402 C6
2425 F10	7402 C5
2426 F7	7401 B5
2427 F6	7402 C2
2428 F10	7403 C7
2429 F5	7404 C1
2430 F9	7405 C6
2431 F4	7406 D7
2432 F5	7407 B7
2433 F7	7408 D6
2434 G14	7409 D6
2435 G10	7410 E8
2436 G3	7411 G4
2437 G10	7412 G14
2438 G10	7413 H13
2439 H10	7414 H6
2440 H3	7415 H11
2441 H2	7416 H4
2442 H3	F4001 A6
2443 H4	F4002 A6
2444 H1	F4003 A6
2445 H6	F4006 A6
2446 H5	F4007 A6
2447 H2	F4008 A5
3401 A14	F4009 A5
3402 A14	F4011 A5
3403 A7	F4015 A4
3404 B8	F4016 A4
3405 A11	F4019 A4
3406 B3	F4020 A4
3407 B3	F4021 A4
3409 B9	F4102 A12
3410 B12	F4103 A12
3411 B13	F4106 A12
3412 B7	F4107 A12
3413 B6	F4108 A11
3414 B5	F4109 A11
3415 B5	F4111 A11
3416 B3	F4115 A10
3417 B11	F4116 A10
3418 B10	F4119 A10
3419 B2	F4120 A10
3420 C4	F4201 C1
3421 C3	F4202 G1
3422 C4	F4203 G1
3423 C5	F4204 G2
3424 C7	F4205 G2
3425 C11	F4206 G2
3426 C11	F4207 G2
3427 C12	F4209 G2
3428 C17	F4210 F2
3429 C17	F4211 F2
3430 C1	F4213 F2
3431 C2	F4215 F1
3432 C2	F4701 C13
3433 C7	F4703 C13
3434 D8	F4705 D13
3435 D7	F4706 D13
3436 D7	F4707 D13
3437 D6	F4712 D13
3438 D7	F4714 D13
3439 D7	F4716 D13
3440 D5	F4718 E13
3441 D7	F4720 E13
3442 E7	F4721 E13
3443 E7	F4722 E13
3444 E3	H401 B3
3445 E2	H02 B2
3446 E6	H03 C2
3447 F4	H04 C2
3448 F6	H05 C1
3449 G10	H06 C5
3450 G10	H07 D6
3451 G13	H08 D8
3452 G10	H09 D9
3453 G11	H10 E1
3454 H7	H11 E7
3455 H10	H13 E7
3456 H5	H14 E9
3457 H5	H15 E7
3458 H11	H16 E7
3459 H13	H17 E7
3460 H14	H18 F7
3461 H7	H19 F9
3462 H7	H21 F7
3463 H13	H22 F9
3464 H12	H24 F7

MOBO: Multi Sound Processing (MSP)

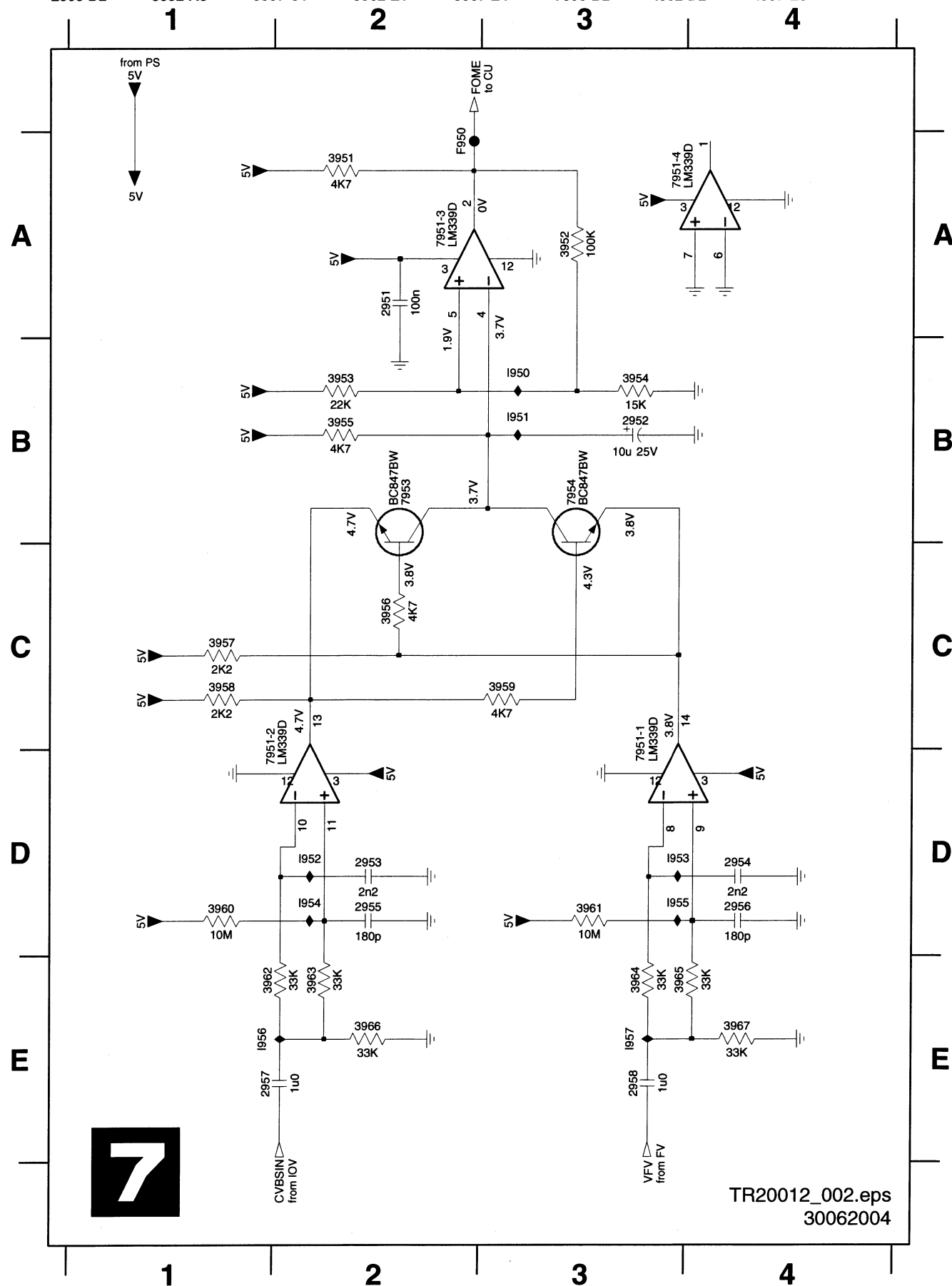


MOBO: Cinch Out (CINCH)



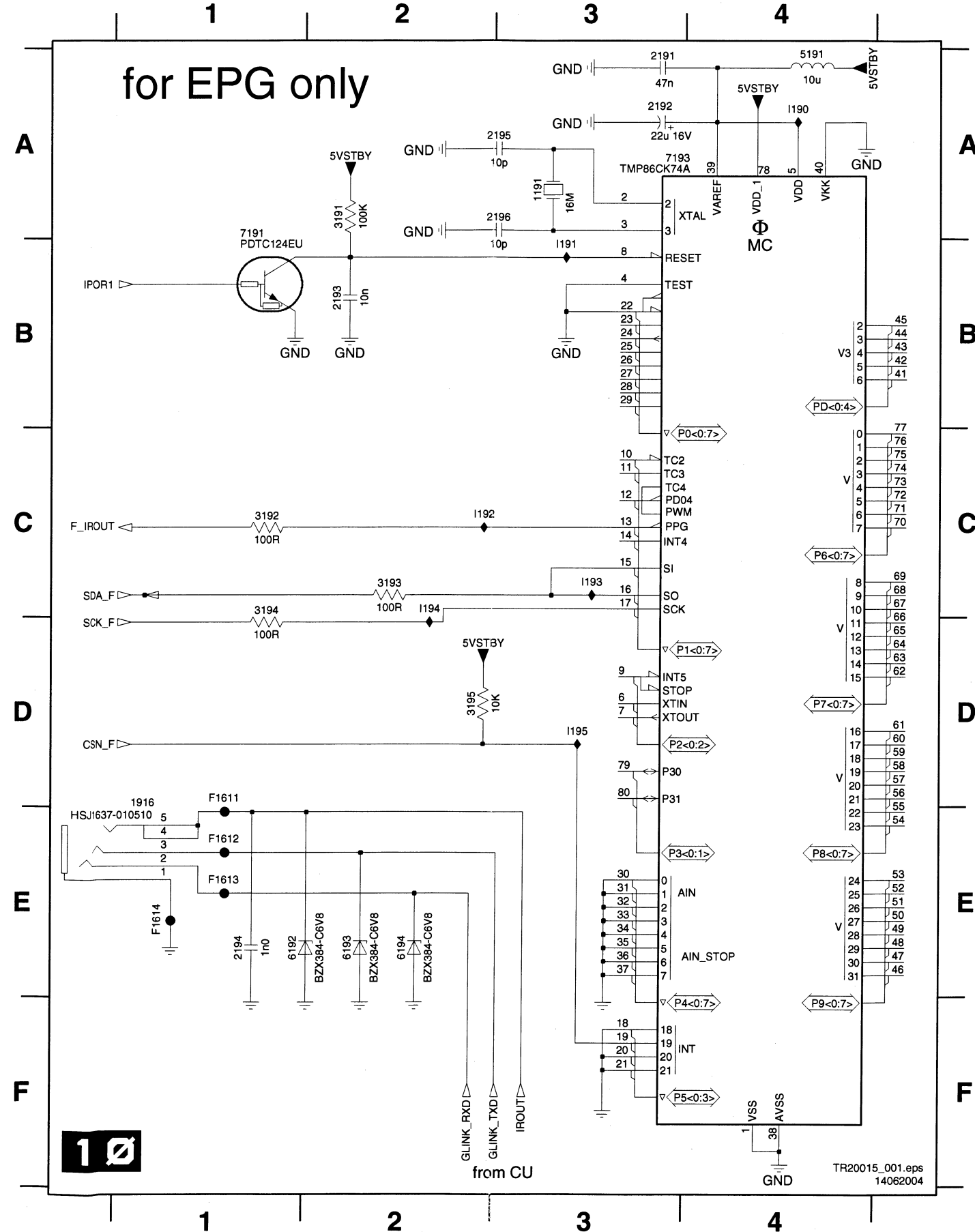
MOBO Board: Follow Me (FOME)

2951 A2	2956 D4	3953 B2	3958 C1	3963 E2	7951-1 D3	7954 B3	I953 D3
2952 B3	2957 E1	3954 B3	3959 C3	3964 E3	7951-2 D1	F950 A2	I954 D2
2953 D2	2958 E3	3955 B2	3960 D1	3965 E3	7951-3 A2	I950 B3	I955 D3
2954 D4	3951 A2	3956 C2	3961 D3	3966 E2	7951-4 A3	I951 B3	I956 E1
2955 D2	3952 A3	3957 C1	3962 E1	3967 E4	7953 B2	I952 D2	I957 E3

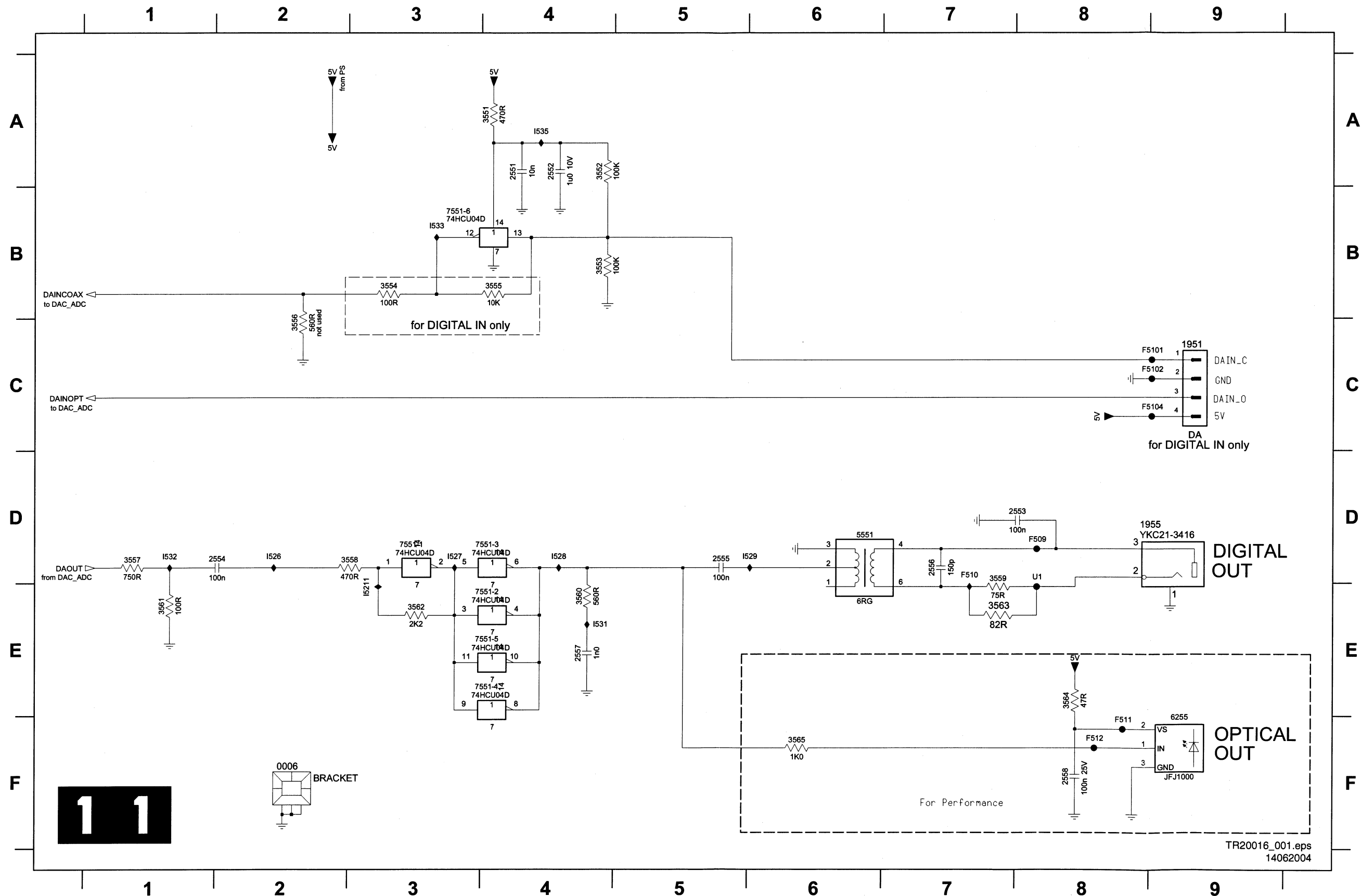


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1191 A3	2192 A3	2195 A3	3192 C1	3195 D2	6193 E2	7193 A4	F1613 E1	I191 B3	I194 C2
1916 D1	2193 B2	2196 A3	3193 C2	5191 A4	6194 E2	F1611 D1	F1614 E1	I192 C2	I195 D3
2191 A3	2194 E1	3191 A2	3194 C1	6192 E1	7191 A1	F1612 E1	I190 A4	I193 C3	

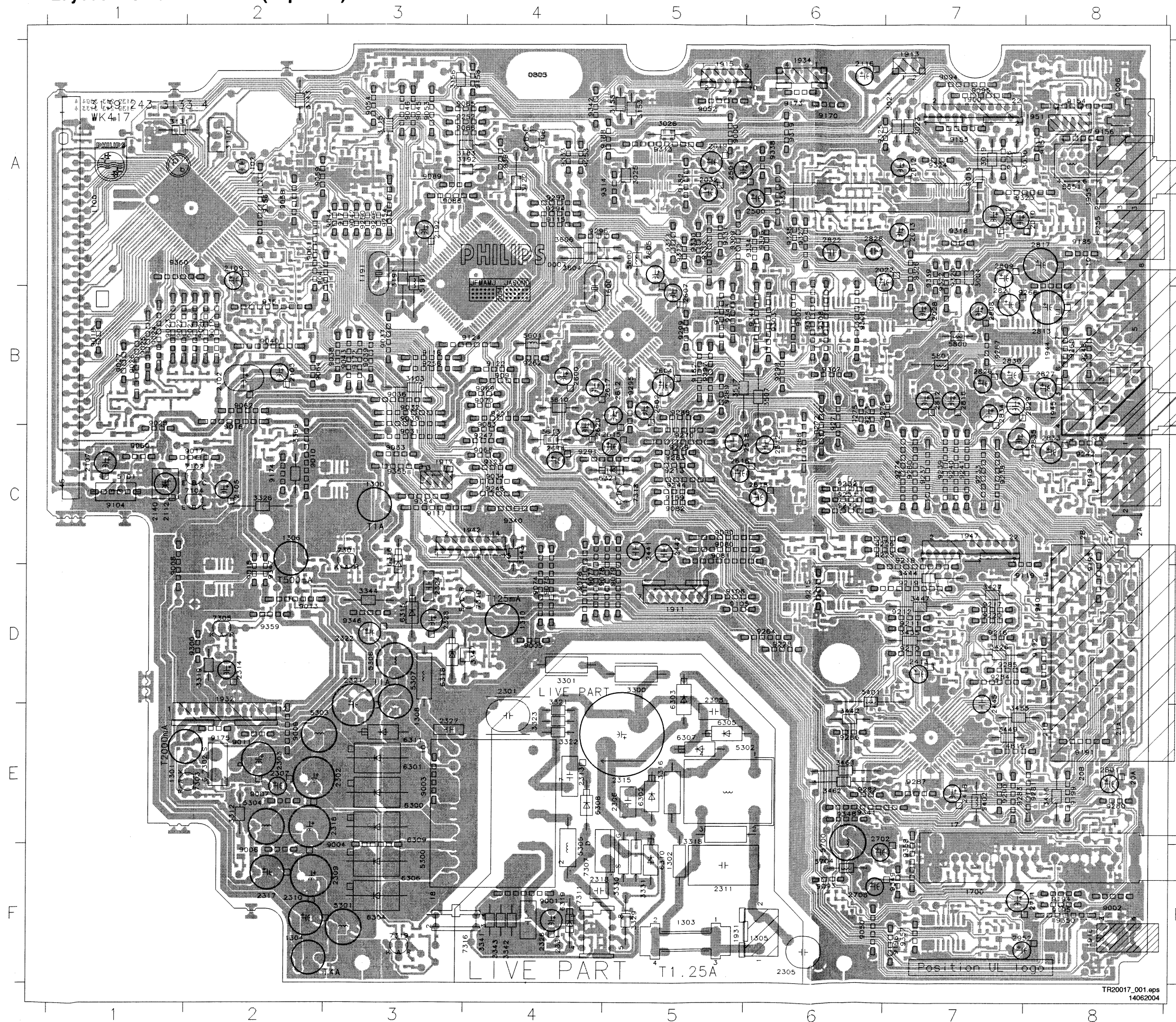


MOBO Board: Digital In/Out 1 (DIGIO 1)



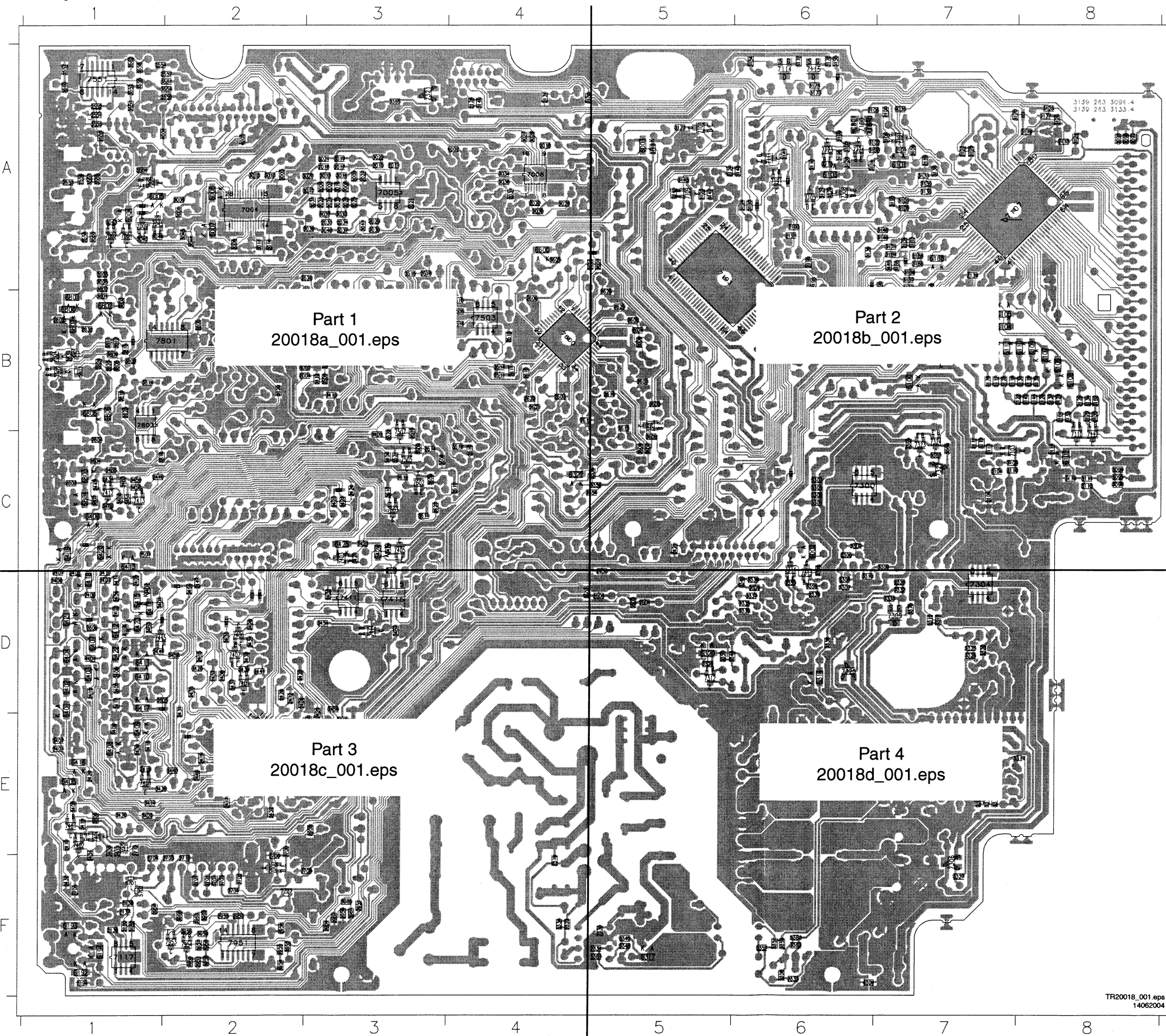
U1 D8
0006 F2
1951 C9
1955 D8
2551 A4
2552 A4
2553 D8
2554 D2
2555 D5
2556 D7
2557 E4
2558 F8
3551 A4
3552 A4
3553 B4
3554 B3
3555 B4
3556 C2
3557 D1
3558 D3
3559 D7
3560 E4
3561 E1
3562 E3
3563 E7
3564 E8
3565 F6
5551 D6
6255 F9
7551-1 D3
7551-2 E4
7551-3 D4
7551-4 E4
7551-5 E4
7551-6 B3
F509 D8
F510 D7
F5101 C9
F5102 C9
F5104 C9
F511 F8
F512 F8
I5211 E3
I526 D2
I527 D3
I528 D4
I529 D6
I531 E4
I532 D1
I533 B3
I535 A4

Layout: MOBO - Main Part (Top View)



0005	A4	3122	A4	9034	C4	9280	E8
0006	A8	3131	A1	9036	B3	9281	E8
0007	A4	3143	A2	9037	B3	9282	E6
0803	A4	3153	A5	9038	B3	9283	E7
1100	A1	3156	A3	9039	B3	9284	D7
1101	A2	3158	A5	9040	B2	9285	D7
1102	A2	3183	A3	9041	A2	9286	E6
1191	A3	3191	A3	9042	A3	9287	E7
1300	C3	3192	A3	9043	B3	9288	B5
1301	E1	3300	D5	9044	A3	9289	B5
1302	F5	3301	D4	9045	A3	9290	E7
1303	F5	3312	E2	9046	A3	9291	C4
1304	F2	3316	E5	9050	F6	9293	A4
1305	F6	3318	E5	9052	A5	9294	A4
1306	C2	3319	D2	9053	A3	9295	B5
1308	E3	3321	D4	9054	A3	9296	A4
1310	D4	3322	E4	9058	A2	9297	B5
1600	B5	3323	E4	9059	A2	9298	B6
1700	F7	3326	C2	9060	C1	9299	B5
1900	A7	3329	F5	9061	A2	9300	D2
1911	D5	3330	F5	9062	B2	9302	B6
1913	A7	3331	F5	9064	B2	9303	B6
1915	A5	3341	F4	9065	A3	9305	B6
1916	F8	3342	F4	9066	A3	9306	B6
1917	C3	3343	F4	9068	C4	9307	B6
1931	F5	3344	D3	9069	B4	9308	B6
1932	D2	3347	D4	9070	A5	9309	A5
1934	A6	3366	C2	9074	D4	9311	A5
1940	D8	3416	E8	9075	D4	9312	A5
1942	C4	3426	D7	9076	D4	9313	A5
1944	B8	3427	D7	9077	D4	9314	A4
1945	B8	3435	D7	9078	D4	9315	B5
1947	C7	3442	E6	9079	D5	9318	A7
1948	C8	3443	C4	9080	C5	9327	A6
1951	A8	3444	D7	9081	C5	9320	A7
1955	A8	3447	D7	9082	C5	9322	A7
2002	A7	3449	E7	9083	B4	9323	A7
2010	A8	3455	E7	9086	A3	9324	A7
2012	A7	3461	E6	9089	A3	9325	A6
2013	A7	3462	E6	9090	C5	9326	A7
2019	A5	3507	B6	9091	A6	9327	A6
2022	A6	3517	B5	9093	F6	9330	A5
2028	B7	3604	A4	9094	A7	9331	A5
2032	A5	3606	A4	9095	A7	9332	A5
2102	B2	3610	B4	9104	C1	9333	A4
2103	B2	3613	C4	9105	D5	9334	A6
2105	C2	4816	E7	9106	D5	9335	A6
2107	C1	5101	C1	9115	A4	9336	A6
2109	A2	5191	A3	9116	B3	9337	A6
2112	C1	5300	F3	9117	C3	9338	A6
2116	A6	5301	F3	9119	D8	9339	A7
2140	C1	5302	E6	9122	B4	9340	C4
2192	A3	5303	E2	9123	C4	9341	E6
2201	D4	5304	E2	9124	B4	9342	A4
2302	E3	5305	F4	9154	A8	9343	B5
2303	E2	5306	D3	9155	A7	9344	B6
2305	F6	5307	D3	9156	A8	9346	D3
2306	E5	5401	D6	9157	A8	9347	D2
2307	E2	5402	E7	9158	A4	9348	E6
2308	D5	5551	A8	9159	C5	9349	F7
2309	F3	5600	A5	9162	B5	9350	F8
2310	F2	5601	B4	9170	A6	9351	B2
2311	F5	5700	E6	9171	A3	9354	C3
2313	E4	5704	F6	9172	B3	9355	C3
2314	D2	5800	B7	9173	A6	9356	A2
2315	E5	5801	B7	9174	C2	9357	F7
2316	E3	6255	A8	9175	E2	9358	F7
2317	F2	6300	E3	9176	A7	9359	D2
2318	F4	6301	E3	9182	A5	9360	A1
2321	D3	6302	E5	9185	A8	9361	A4
2322	D3	6303	D5	9188	A4		
2324	D3	6304	F3	9191	E8		
2326	F4	6305	E5	9192	D8		
2327	E3	6306	F3	9193	C8		
2328	D3	6307	E5	9194	F8		
2331	F4	6308	E4	9195	F8		
2413	D7	6309	E3	9196	F7		
2418	E7	6310	F5	9199	E8		
2441	C5	6311	E3	9210	D7		
2442	C5	6315	D3	9211	D7		
2445	D7	6316	C3	9212	D7		
2500	A8	6318	D3	9213	C5		
2501	A5	6319	F4	9215	D6		
2512	C6	6321	C5	9216	D7		
2518	C6	7102	C2	9217	D7		
2600	B4	7104	C2	9218	C7		
2602	B5	7106	A4	9219	D7		
2604	B5	7301	C3	9220	D7		
2605	A5	7302	E2	9225	C7		
2607	B5	7303	E2	9226	C7		
2612	B5	7305	D2	9228	D6		
2614	C4	7307	F4	9230	C6		
2615	C5	7310	D4	9231	C6		
2616	C5	7311	F4	9232	C6		
2617	B5	7316	F4	9233	C7		
2618	C6	7318	C5	9237	C7		
2620	C4	7319	F3	9238	C7		
2702	E6	9000	A5	9239	C7		
2706	F6	9001	F4	9240	C7		
2711	F8	9002	F8	9241	C7		
2801	E8	9003	E3	9242	C8		
2808	B7	9004	F3	9244	C5		
2809	A7	9005	D4	9245	C4		
2812	B7	9006	F2	9246	A3		
2813	B8	9007	E2	9247	C4		
2816	B7	9008	D1	9248	B8		
2817	A8	9009	E2	9250	A3		
2821	B7	9010	C2	9251	B4		
2822	A6	9011	E2	9252	A3		
2826	B7	9013	D2	9253	A4		
2827	B8	9015	D2	9254	A3		
2828	A6	9016	C2	9256	C2		
2829	B8	9017	C2	9260	C7		
2830	B7	9018	B1	9262	B4		
2833	C8	9019	B2	9263	C5		
2834	B7	9020	B2	9264	D6		
2835	C8	9021	B2	9265	B8		
2852	F7	9022	B1	9266	B8		
3004	A7	9023	B1	9267	B7		
3018	A7	9024	B1	9268	C6		
3019	A7	9025	B1	9269	C5		
3023	A7	9026	B1	9270	C5		
3024	A7	9027	B1	9271	B6		
3025	A5	9028	B1	9272	C6		
3026	A5	9030	B3	9273	B6		
3030	A7	9031	C3	9274	C7		
3103	B3	9032	B3	9275	B6		
3115	A3	9033	C3	9276	B6		

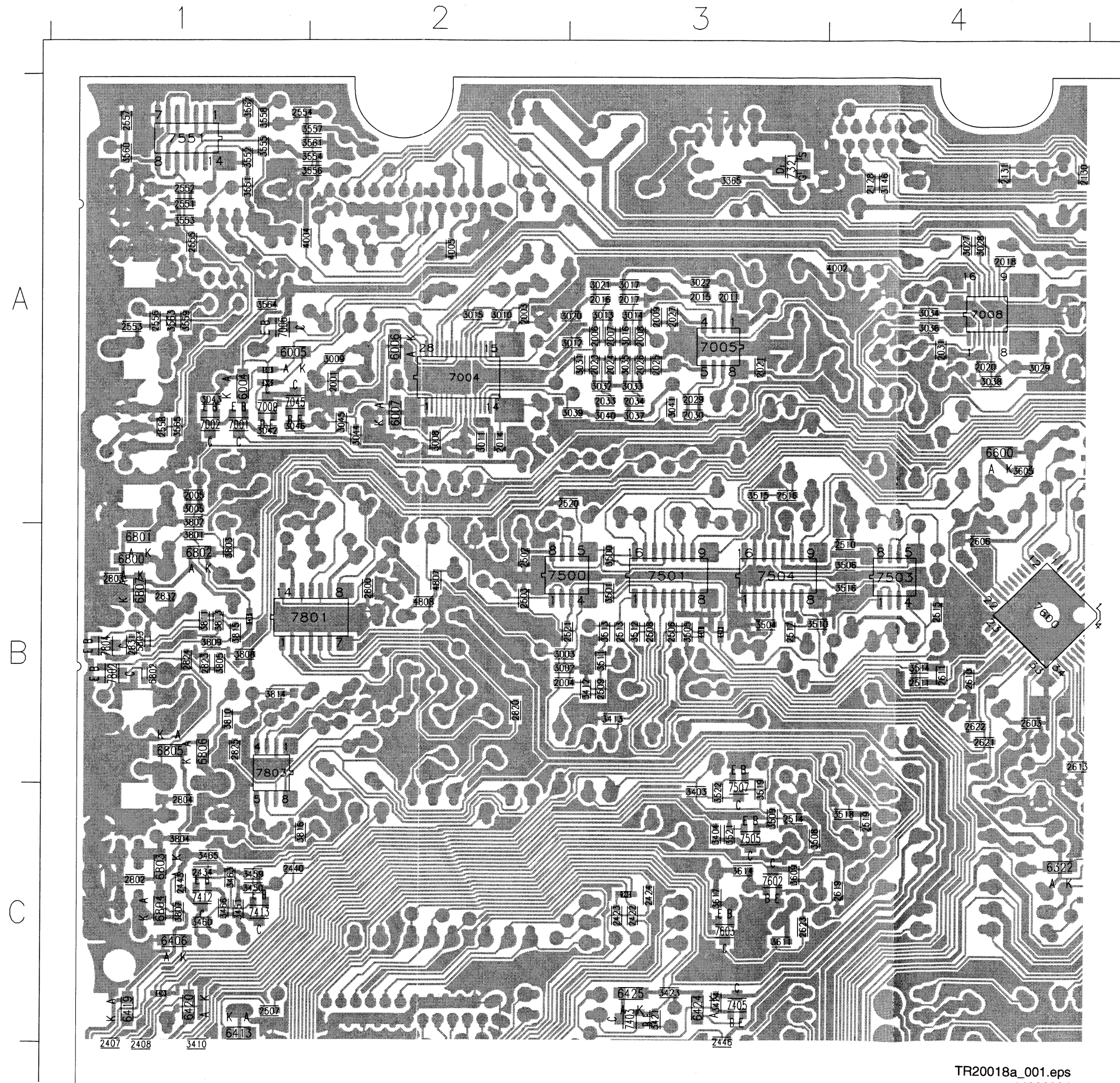
Layout: MOBO - Main Part (Bottom View)



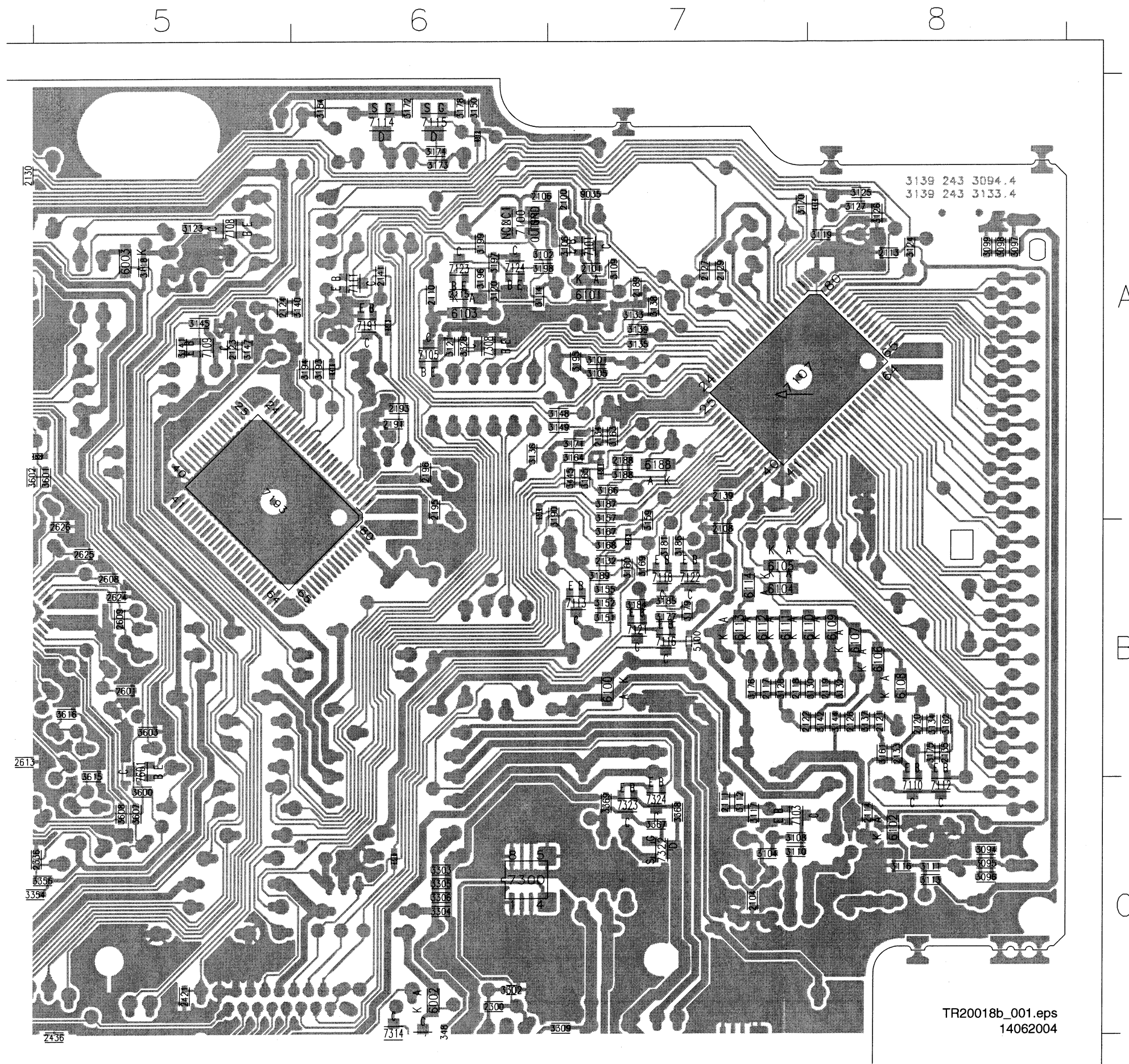
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2002	A2	2610	B4	3133	A7	3421	C3	4408	D1	7312	D6
2004	B2	2611	B4	3134	B8	3422	E1	4409	D2	7313	D6
2005	A1	2613	B3	3135	A7	3423	C3	4410	D2	7314	C6
2006	A3	2614	C3	3136	A6	3424	C3	4411	D2	7321	A1
2007	A3	2615	B4	3137	B8	3425	D2	4412	D2	7322	C7
2008	A3	2616	A3	3138	A7	3426	D2	4413	B7	7323	C7
2009	A3	2617	B3	3139	A7	3429	E1	4414	A6	7324	C7
2011	A3	2619	C4	3140	A6	3430	E1	4415	B1	7325	D6
2014	A2	2620	A3	3141	A5	3431	F1	4416	A6	7401	E1
2015	A3	2621	B3	3142	B8	3432	F1	4418	B3	7402	E1
2016	A3	2651	A1	3144	B8	3433	D2	4422	B3	7403	C3
2017	A3	2652	A1	3145	A5	3434	D2	4807	B2	7404	E1
2018	A4	2653	A1	3146	A4	3436	E1	4808	B2	7405	C3
2020	A4	2654	A1	3147	A5	3437	D2	4809	A5	7406	D2
2021	A3	2655	A1	3148	A7	3438	D2	4810	C6	7407	D2
2023	A3	2656	A1	3149	A7	3439	D2	4811	A7	7408	E1
2024	A3	2657	A1	3150	A6	3440	E2	4812	A6	7409	D2
2025	A3	2658	A1	3151	B7	3441	D2	4813	A6	7410	E2
2026	A3	2601	B5	3152	B7	3445	A7	4814	A6	7411	D3
2027	A3	2603	B4	3154	A6	3446	E2	4815	A1	7412	C1
2029	A3	2606	B4	3155	B7	3448	E3	5100	B7	7413	C1
2030	A3	2608	B5	3157	A7	3450	C1	5701	F1	7414	D3
2031	A4	2609	B5	3158	B7	3451	C1	5702	F1	7415	D1
2033	A3	2610	B4	3160	B7	3452	E2	5703	F2	7416	D3
2034	A3	2611	B4	3161	B8	3453	D1	5706	E1	7500	B2
2100	A7	2613	B4	3162	B8	3454	D3	5802	B1	7501	B3
2101	A7	2619	C4	3163	A7	3456	D3	5803	B1	7503	B4
2104	C7	2621	B4	3164	A7	3457	D3	6002	C8	7504	B3
2106	A6	2622	B4	3165	A7	3458	D2	6003	A5	7505	C3
2108	B7	2623	C3	3166	A7	3459	C1	6004	A1	7507	C3
2110	A6	2624	B5	3167	B7	3460	C1	6005	A1	7551	A1
2111	C7	2625	B5	3168	B7	3463	C1	6006	A2	7600	B4
2113	A8	2626	B5	3169	B7	3464	D2	6007	A2	7601	B5
2114	C9	2700	F2	3170	A7	3465	C1	6100	B7	7602	C3
2115	A6	2701	F2	3171	A7	3466	C1	6101	A7	7603	C3
2117	B7	2703	F2	3172	A6	3500	B3	6102	C8	7801	B2
2118	B7	2704	F1	3173	A6	3501	B3	6103	A6	7802	B1
2119	B8	2705	F1	3174	A6	3502	D4	6104	B7	7803	B1
2120	B8	2706	F1	3175	B7	3503	D5	6105	B7	7804	B1
2121	B8	2709	F3	3176	B7	3504	B3	6106	B8	7951	F2
2122	B7	2710	F2	3177	B7	3505	B3	6107	B8	7953	F2
2123	A5	2712	E1	3178	A6	3506	B4	6108	B8	7954	F2
2124	A5	2800	B2	3179	B7	3508	C3	6109	B8	9035	A7
2126	B8	2802	C1	3180	B7	3509	C3	6110	B8	9234	C3
2127	A7	2803	B1	3181	B7	3510	B3	6111	B7	9235	D1
2128	A4	2804	C1	3182	F1	3511	B3	6112	B7	9236	D1
2129	A7	2805	D1	3184	B7	3512	B3	6113	B7		
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2131	A4	2820	B2	3186	B7	3514	B4	6188	A7		
2132	B7	2821	A1	3187	A7	3515	A3	6189	F1		
2133	B8	2824	B1	3188	A7	3516	B4	6193	F1		
2134	A7	2825	B1	3189	B7	3518	C4	6194	F1		
2135	B8	2831	B1	3190	A7	3519	C3	6312	E6		
2136	F1	2832	B1	3193	A6	3521	C3	6313	E7		
2137	F1	2833	F1	3194	F2	3522	C3	6314	D6		
2138	F1	2953	F2	3195	A7	3551	A1	6317	F5		
2139	A7	2954	F2	3196	A6	3552	A1	6320	D5		
2141	A6	2955	F2	3197	A6	3553	A1	6322	C4		
2188	A7	2956	F3	3198	A6	3554	A2	6401	D1		
2189	A7	2957	F3	3199	A6	3555	A1	6402	D1		
2191	A6	2958	E3	3202	C6	3556	A2	6403	D1		
2193	A6	3002	B2	3203	C6	3557	A2	6404	D1		
2194	F1	3003	B2	3204	C6	3558	A1	6405	E1		
2195	A6	3005	A1	3205	C6	3559	A1	6406	C1		
2196	A6	3008	A2	3206	C6	3560	A1	6407	D1		
2200	C6	3009	C6	3207	D6	3561	A2	6408	E1		
2204	E7	3010	A2	3208	D6	3562	A1	6409	E1		
2212	D7	3011	A2	3209	C7	3563	A1	6410	D1		
2219	F4	3012	A3	3210	D6	3564	A1	6411	D1		
2220	D7	3013	A3	3211	E8	3565	A1	6412	D1		
2223	F4	3014	A3	3213	F4	3600	C5	6413	C1		
2225	D6	3015	A2	3214	E7	3601	A5	6414	D1		
2229	D5	3016	A3	3215	E7	3602	A4	6415	D1		
2230	F5	3017	A3	3217	D7	3603	B5	6416	E1		
2233	F6	3020	A3	3220	D7	3605	A4	6417	D1		
2234	F5	3021	A3	3224	C5	3607	D1	6418	D1		
2235	D6	3022	A3	3225	D7	3608	C5	6419	C1		
2236	C5	3027	A4	3227	F7	3609	C3	6420	C1		
2401	E1	3028	A4	3228	A6	3611	C3	6421	D1		
2402	D1	3029	A4	3232	D7	3614	C3	6422	D1		
2403	D1	3031	A3	3233	D7	3615	B5	6423	D1		
2404	D1	3032	A3	3234	F4	3616	B5	6424	C3		
2405	D1	3033	A3	3235	D6	3617	C3	6425	C3		
2406	D1	3034	A4	3236	D6	3700	E2	6600	A4		
2407	D1	3035	A3	3237	D6	3701	F2	6800	B1		
2408	D1	3036	A4	3238	D6	3702	F2	6801	B1		
2409	D1	3037	A3	3239	D6	3703	F2	6802	B1		
2410	E1	3038	A4	3240	D6	3704	F2	6803	C1		
2411	E1	3039	A3	3245	F5	3800	E1	6804	C1		
2412	D2	3040	A3	3246	F5	3801	B1	6805	B1		
2414	E2	3041	A3	3248	C6	3802	A1	6806	B1		
2415	D2	3042	A1	3249	D5	3803	B1	6807	B1		
2416	E2	3043	A1	3250	D5	3804	C1	7000	F2		
2417	E2	3044	A2	3251	F6	3805	B1	7001	A1		
2419	E1	3045	A2	3253	D6	3807	C1	7002	A1		
2420	D2	3046	A1	3254	C5	3808	B1	7004	A2		
2421	C5	3094	C8	3255	D6	3809	B1	7005	A3		
2422	C3	3095	C8	3256	C5	3810	B1	7006	A1		
2423	C3	3096	C8	3257	F6	3811	B1	7008	A4		
2424	C3	3097	A8	3258	F6	3813	B1	7009	A1		
2425	E3	3098	A8	3259	F6	3814	B1	7045	A1		
2426	D2	3099	A8	3261	F5	3815	B1	7100	A6		
2427	E3	3101	A7	3262	F6	3816	C1	7101	A7		
2428	D2	3102	A6	3263	F6	3951	F3	7103	C7		
2429	E3	3104	C7	3265	A3	3952	F2	7105	A6		
2430	E3	3105	A7	3267	C7	3953	F2	7107	A7		
2431	D2	3106	A7	3268	C7	3954	F2	7108	A5		
2432	D3	3108	C7	3269	C7	3955	F2	7109	A5		
2433	E3	3109	A7	3270	D7	3956	F2	7110	C8		
2434	C1	3110	C7	3401	D1	3957	F2	7111	A6		
2435	D2	3111	C8	3402	D1	3958	F2	7112	C8		
2436	D5	3112	C7	3403	C3	3959	F2	7113	B7		
2437	D2	3113	C8	3404	C3	3960	F2	7114	A6		
2438	D2	3114	A6	3405	D1	3961	F3	7115	A6		
2439	D2	3116	C8	3406	E1	3962	F2	7116	B7		
2440	C1	3117	C7	3407	E1	3963	F2	7117	F1		
2443	C1	3118	A5	3408	E1	3964	F3	7118	B7		
2444	D1	3119	A8	3409	E1	3965	F3	7121	B7		
2446	C3	3120	A6	3410	D1	3966	F2	7122	B7		
2447	D1	3121	A6	3411	D1	3967	F3	7123	A6		
2502	B2	3123	A5	3412	B3	4002	A4	7124	A5		
2503	B2	3124	A8	3413	B3	4004	A1	7191	A6		
2504	D5	3125	A8	3414	E1	4005	A2	7193	A5		
2505	D5	3126	A8	3415	D1	4304	F6	7300	C6		
2506	B3	3127	A8	3417	D1	4305	A1	7304	D7		
2507	C1	3128	B7	3418	E1	4401	D1	7306	F7		
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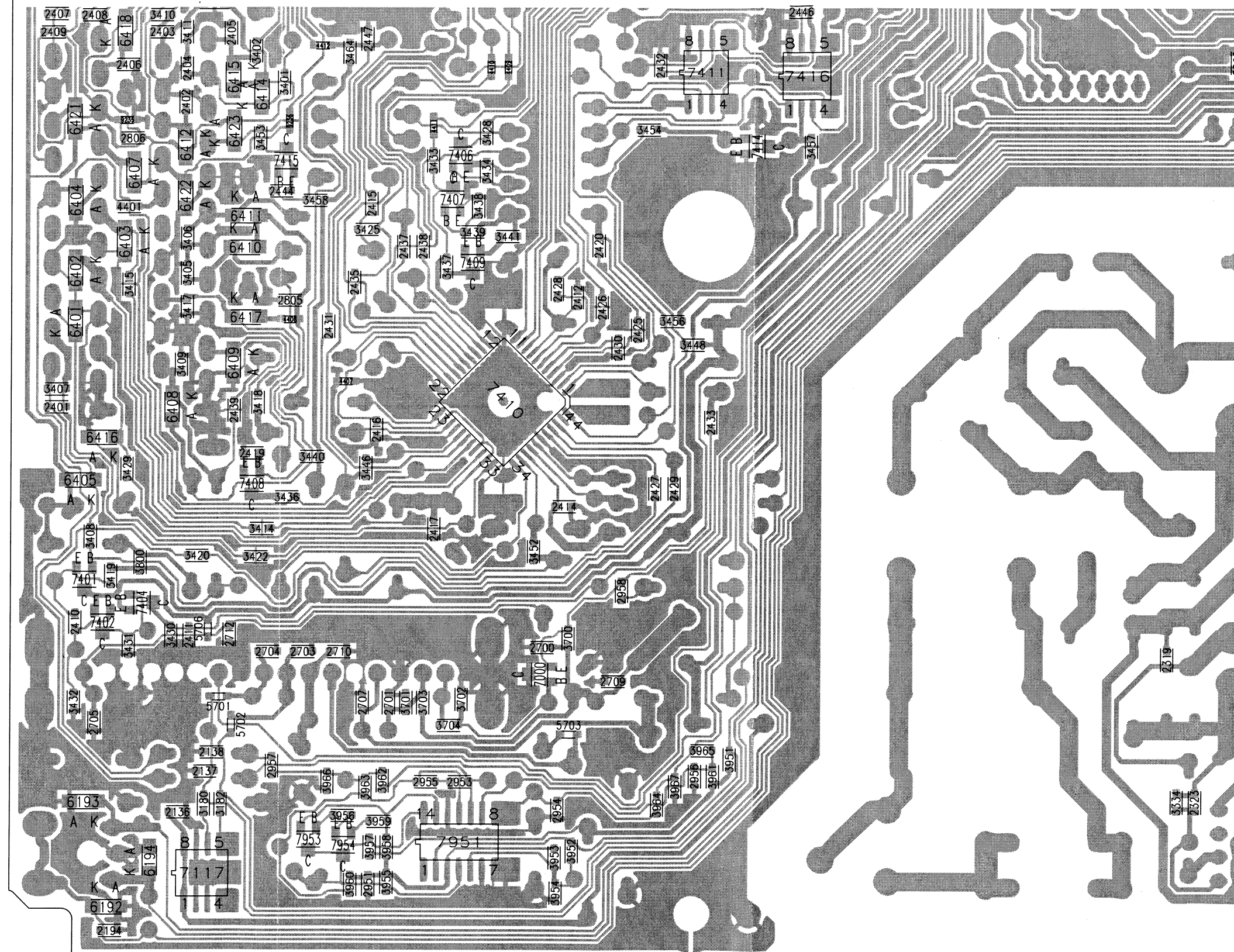
Layout: MOBO - Main Part (Bottom View) Part 1



Layout: MOBO - Main Part (Bottom View) Part 2

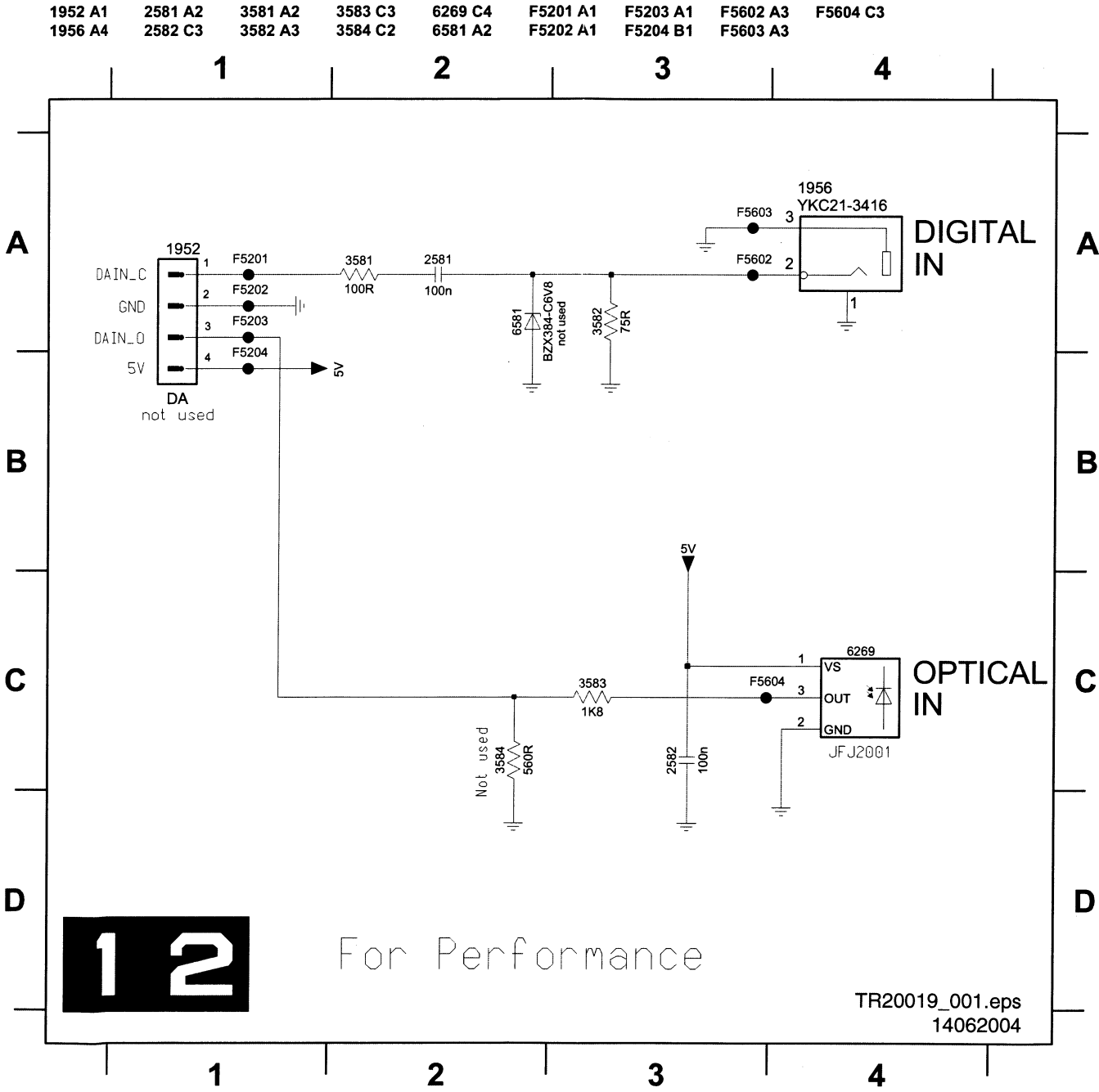


Layout: MOBO - Main Part (Bottom View) Part 3

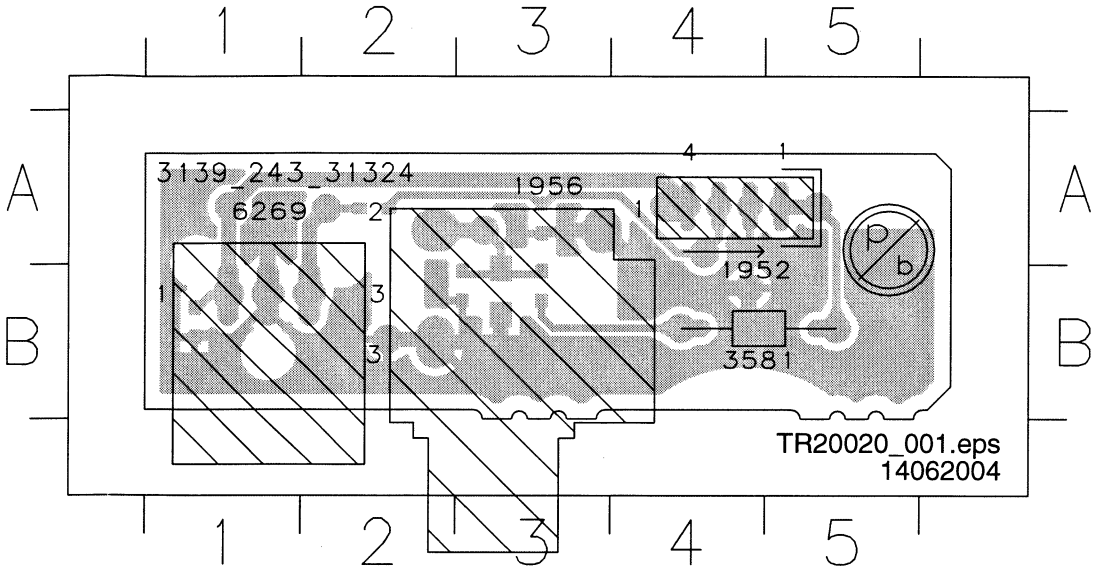


8

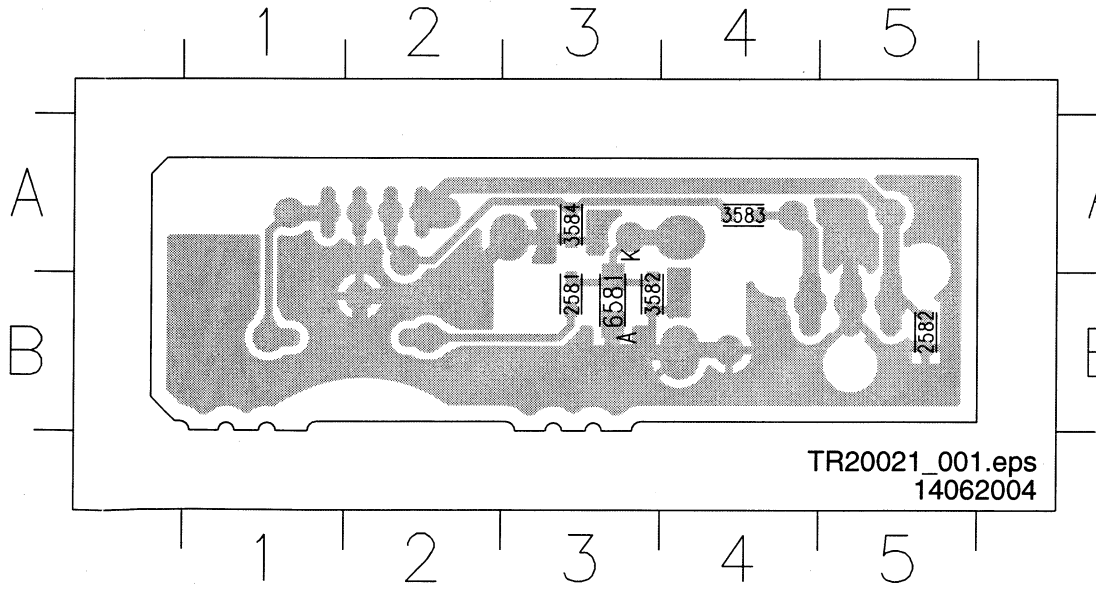
MOBO : Digital In/Out 2 (DIGIO 2)



Layout: MOBO - Digital In/Out 2 Part

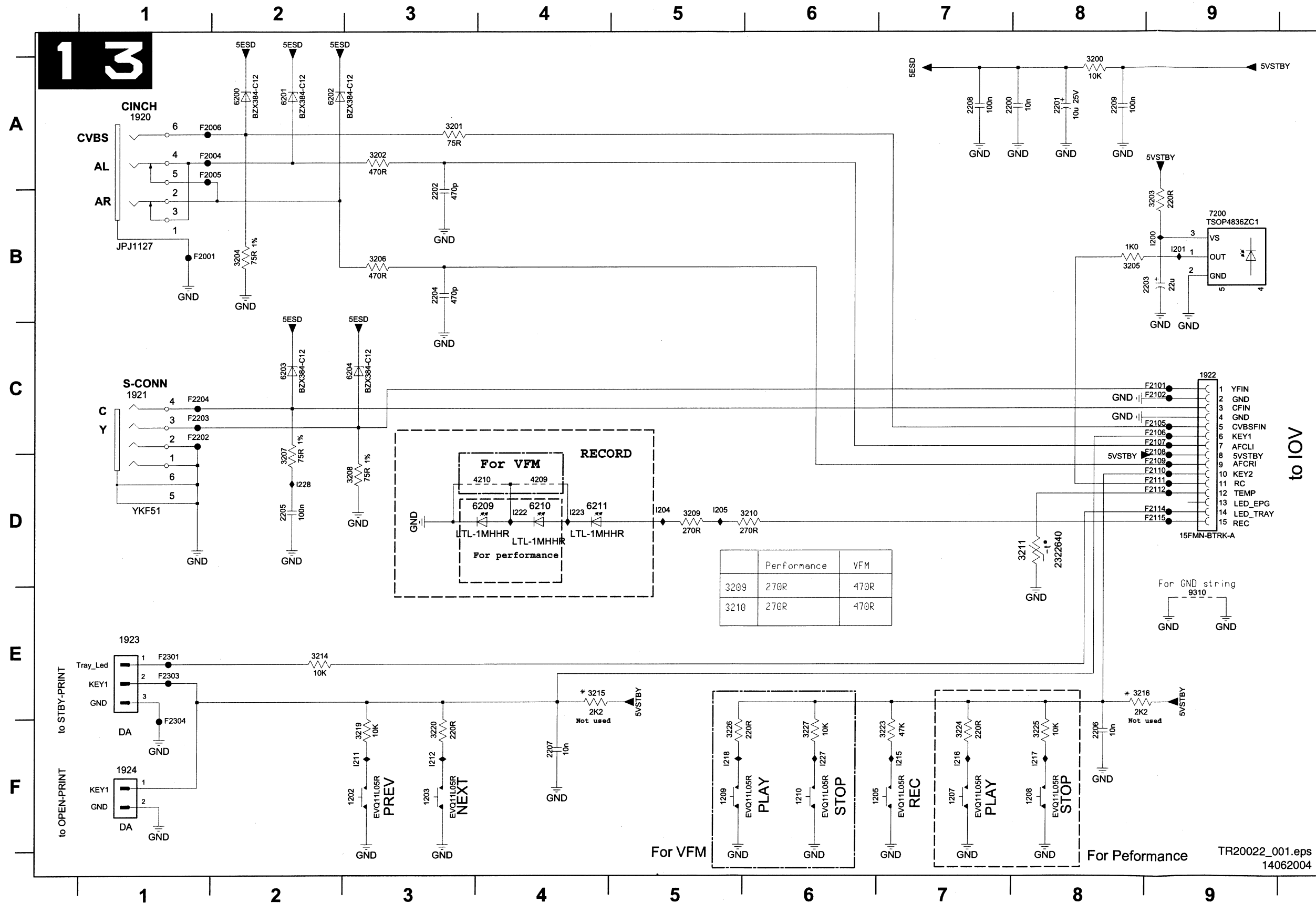


1952 B4
1956 A3
3581 B4
6269 A1



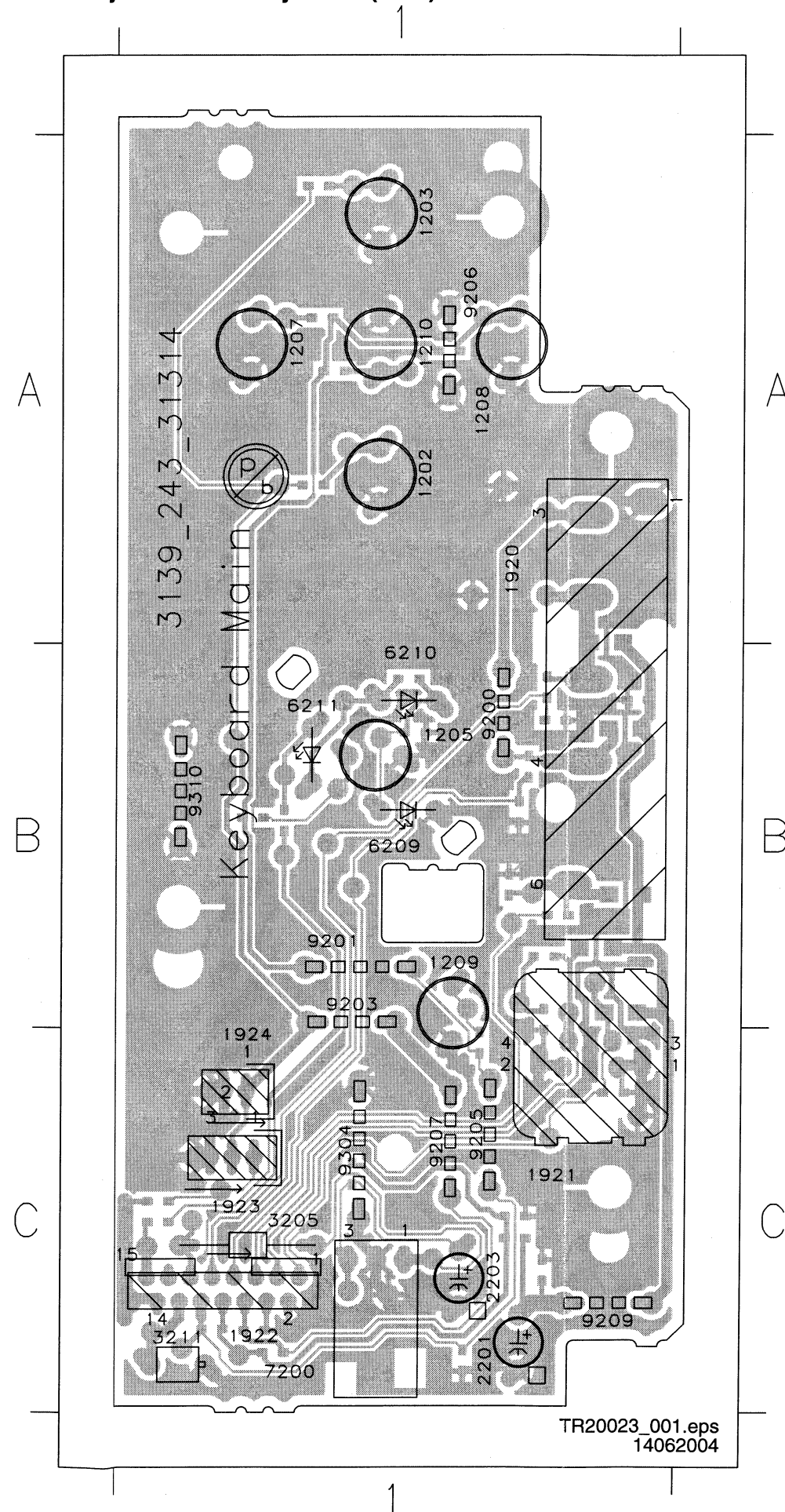
2581 B3
2582 B5
3582 B3
3583 A4
3584 A3
6581 B3

MOBO Keyboard (KEY)

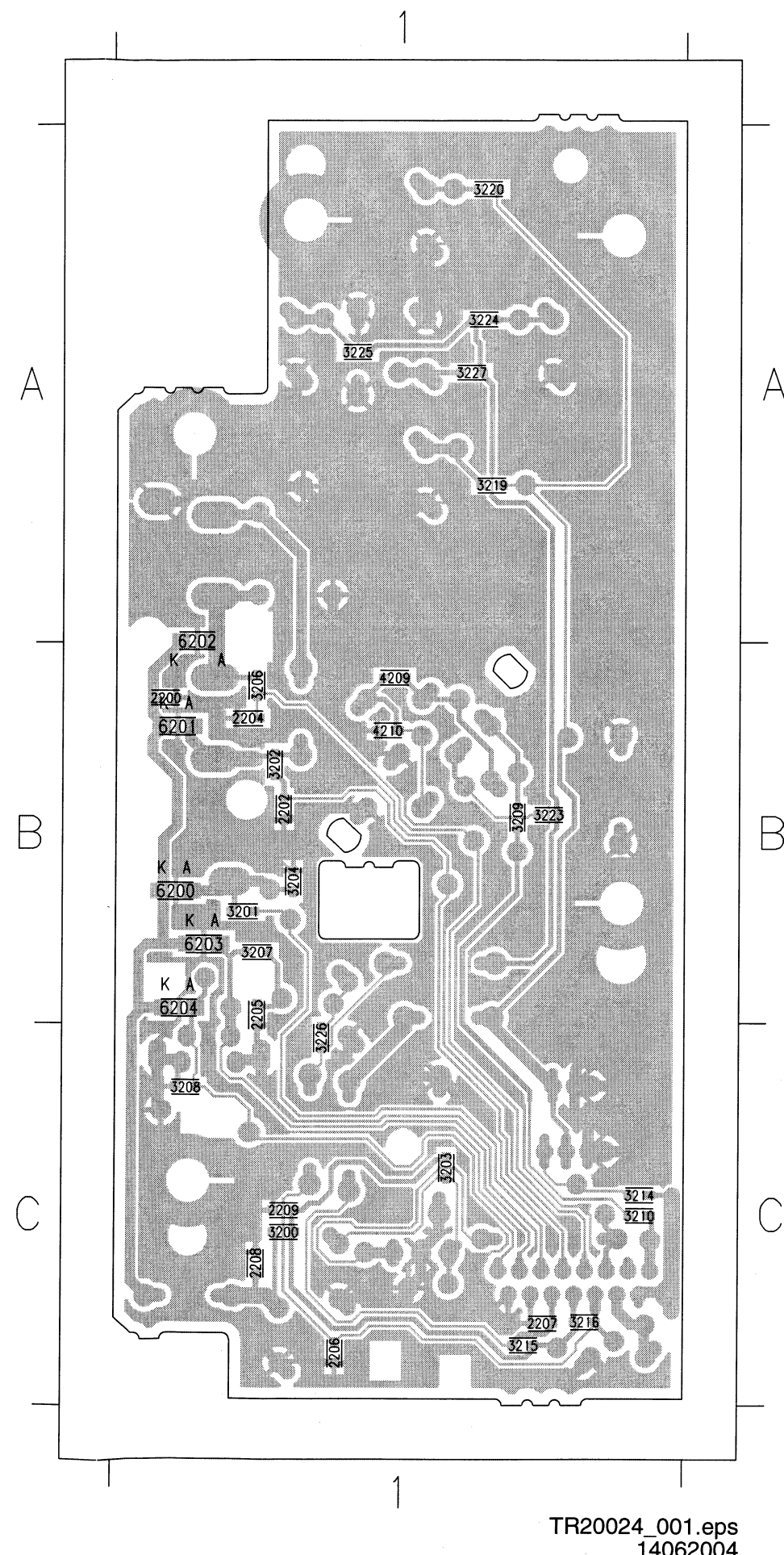


1202 F3
1203 F3
1205 F7
1207 F7
1208 F8
1209 F5
1210 F6
1920 A1
1921 C1
1922 C9
1923 E1
1924 F1
2200 A7
2201 A8
2202 B3
2203 B9
2204 B3
2205 D2
2206 F8
2207 F4
2208 A7
2209 A8
3200 A8
3201 A3
3202 A3
3203 B9
3204 B2
3205 B8
3206 B3
3207 D2
3208 D3
3209 D5
3210 D6
3211 D8
3214 E2
3215 E4
3216 E8
3219 F3
3220 F3
3223 F7
3224 F7
3225 F8
3226 F5
3227 F6
4209 D4
4210 D4
6200 A2
6201 A2
6202 A2
6203 C2
6204 C3
6209 D4
6210 D4
6211 D4
7200 B9
9310 E9
F2001 B1
F2004 A1
F2005 A1
F2006 A1
F2101 C9
F2102 C9
F2105 C9
F2106 C9
F2107 C9
F2108 D9
F2109 D9
F2110 D9
F2111 D9
F2112 D9
F2114 D9
F2115 D9
F2202 C1
F2203 C1
F2204 C1
F2301 E1
F2303 E1
F2304 F1
I200 B9
I201 B9
I204 D5
I205 D5
I211 F3
I212 F3
I215 F7
I216 F7
I217 F8
I218 F5
I222 D4
I223 D4
I227 F6
I228 D2

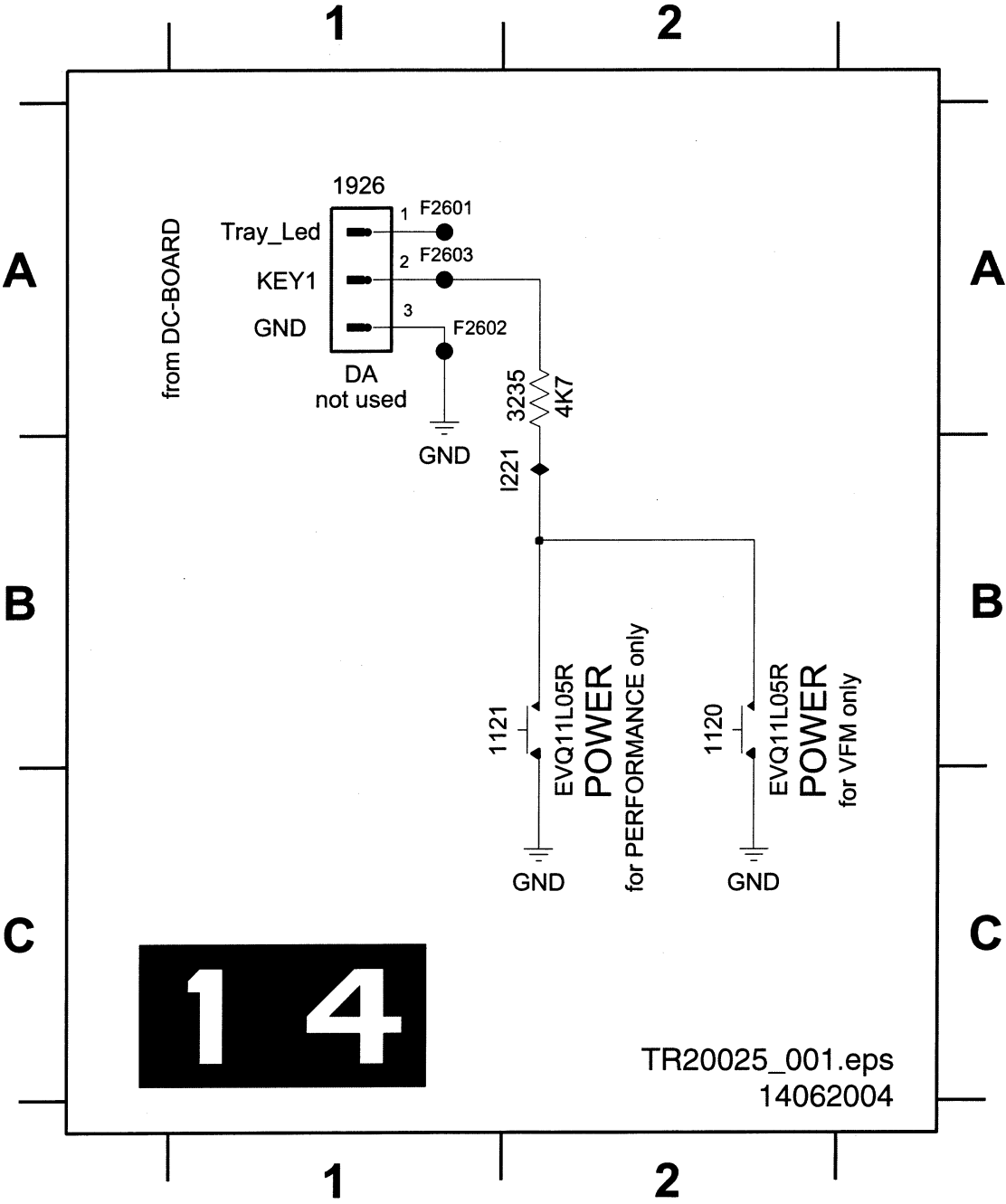
Layout MOBO Keyboard (KEY)



1202 A1
1203 A1
1205 B1
1207 A1
1208 A1
1209 B1
1210 A1
1920 A1
1921 C1
1922 C1
1923 C1
1924 C1
2201 C1
2203 C1
3205 C1
3211 C1
6209 B1
6210 B1
6211 B1
7200 C1
9200 B1
9201 B1
9203 B1
9205 C1
9206 A1
9207 C1
9209 C1
9304 C1
9310 B1

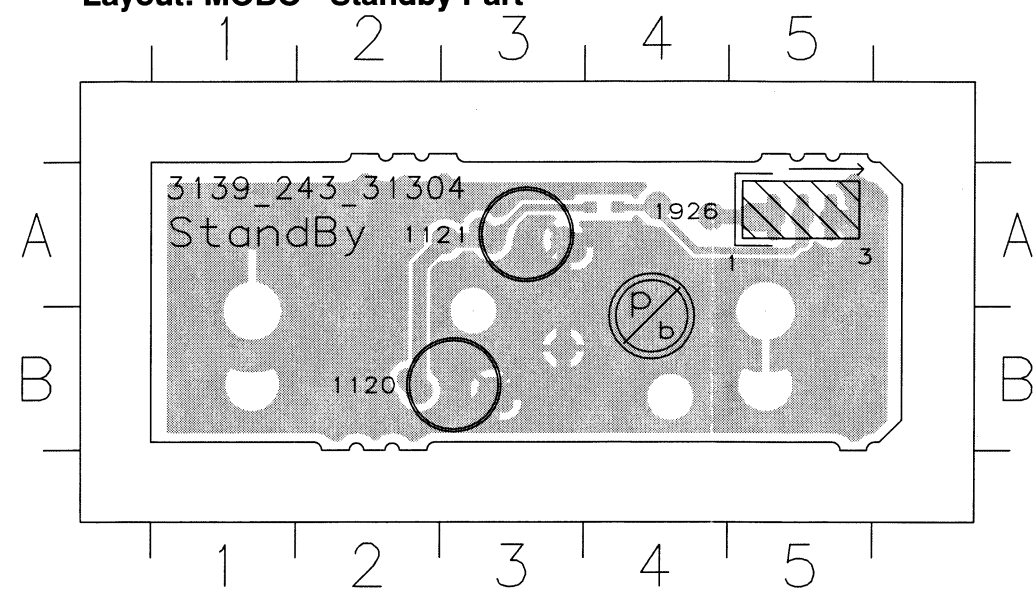


MOBO: Stand-by(STBY)

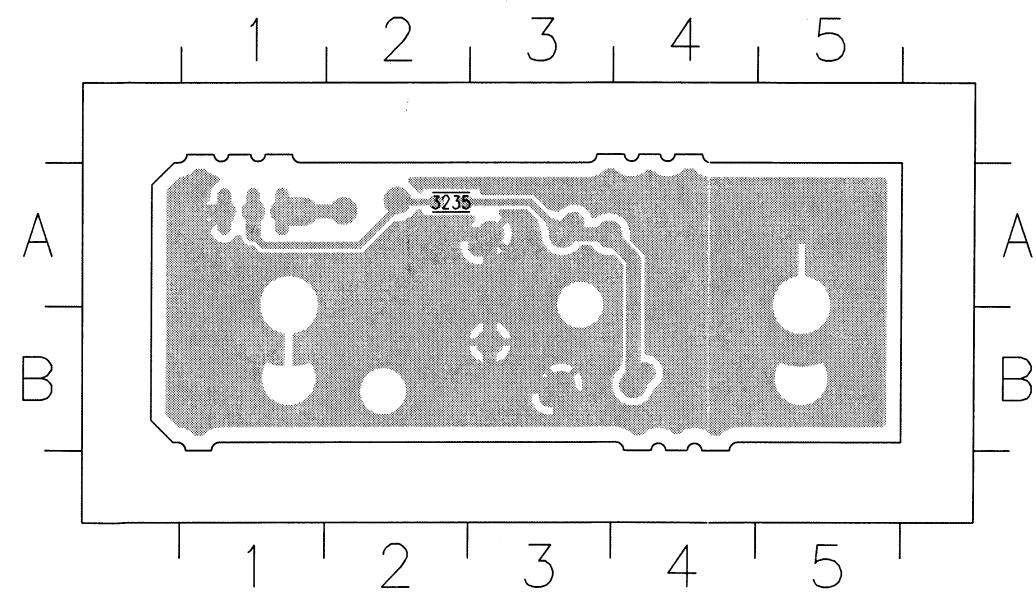


- 1120 B2
- 1121 B2
- 1926 A1
- 3235 A2
- F2601 A1
- F2602 A1
- F2603 A1
- I221 B2

Layout: MOBO - Standby Part

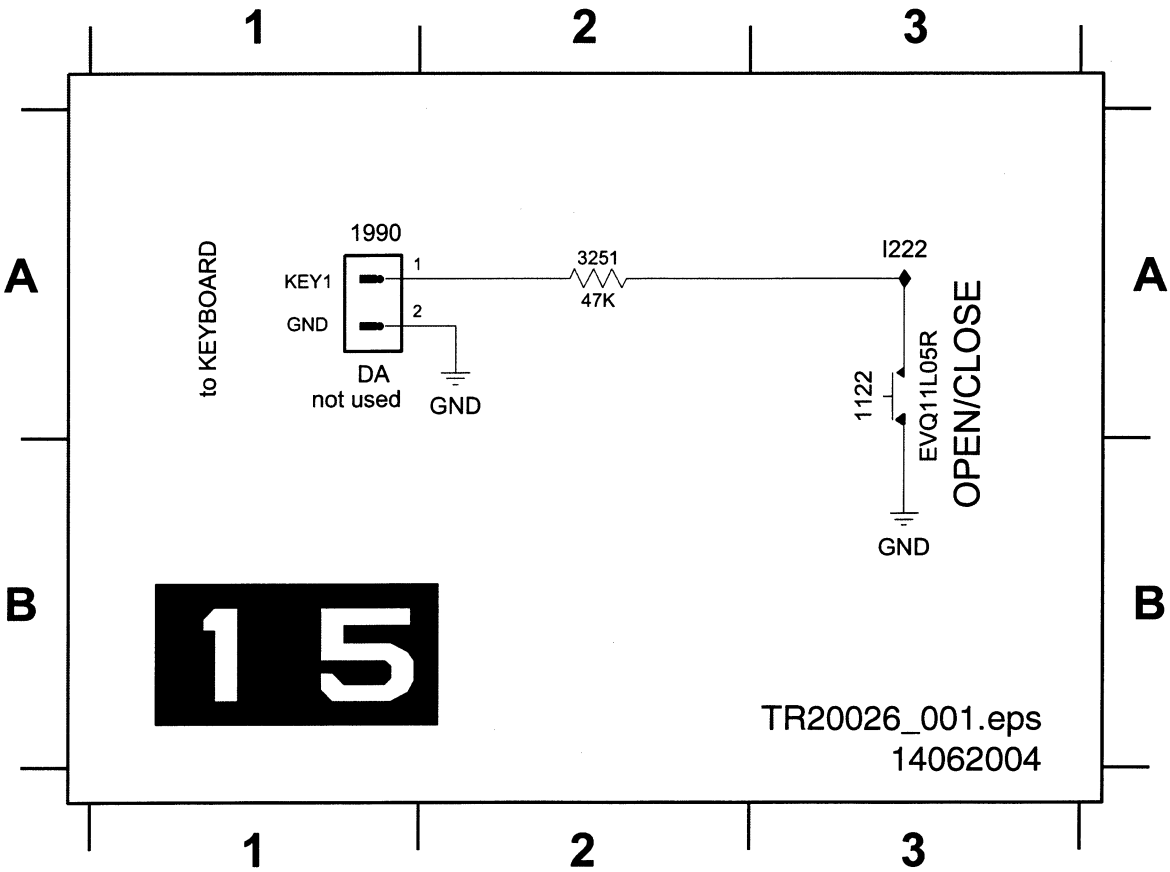


1120 B2
1121 A2
1926 A4



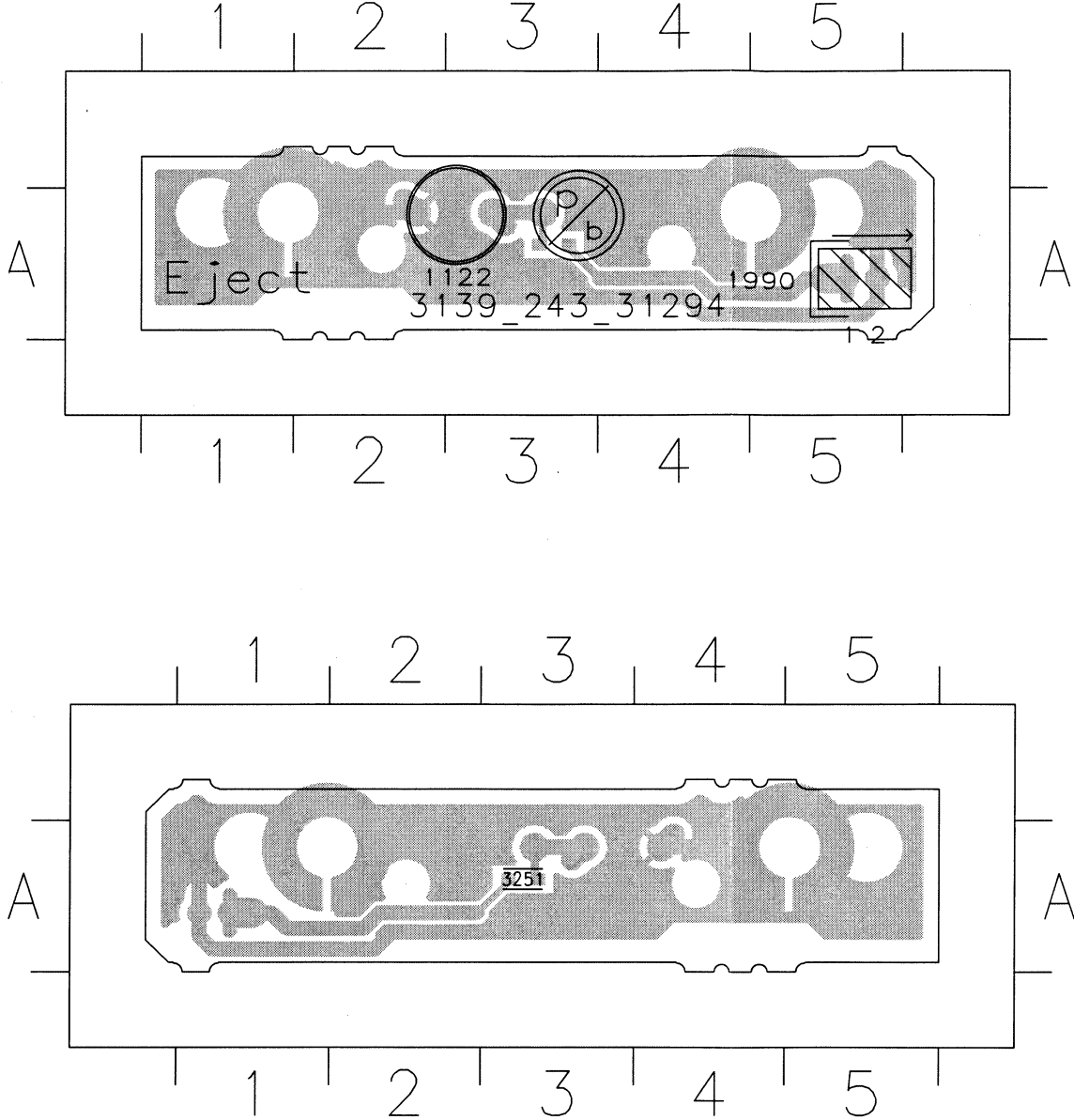
3235 A2

MOBO: Open/Close (OPCL)



TR20026_001.eps
14062004

Layout: MOBO - Open/Close (OPCL)

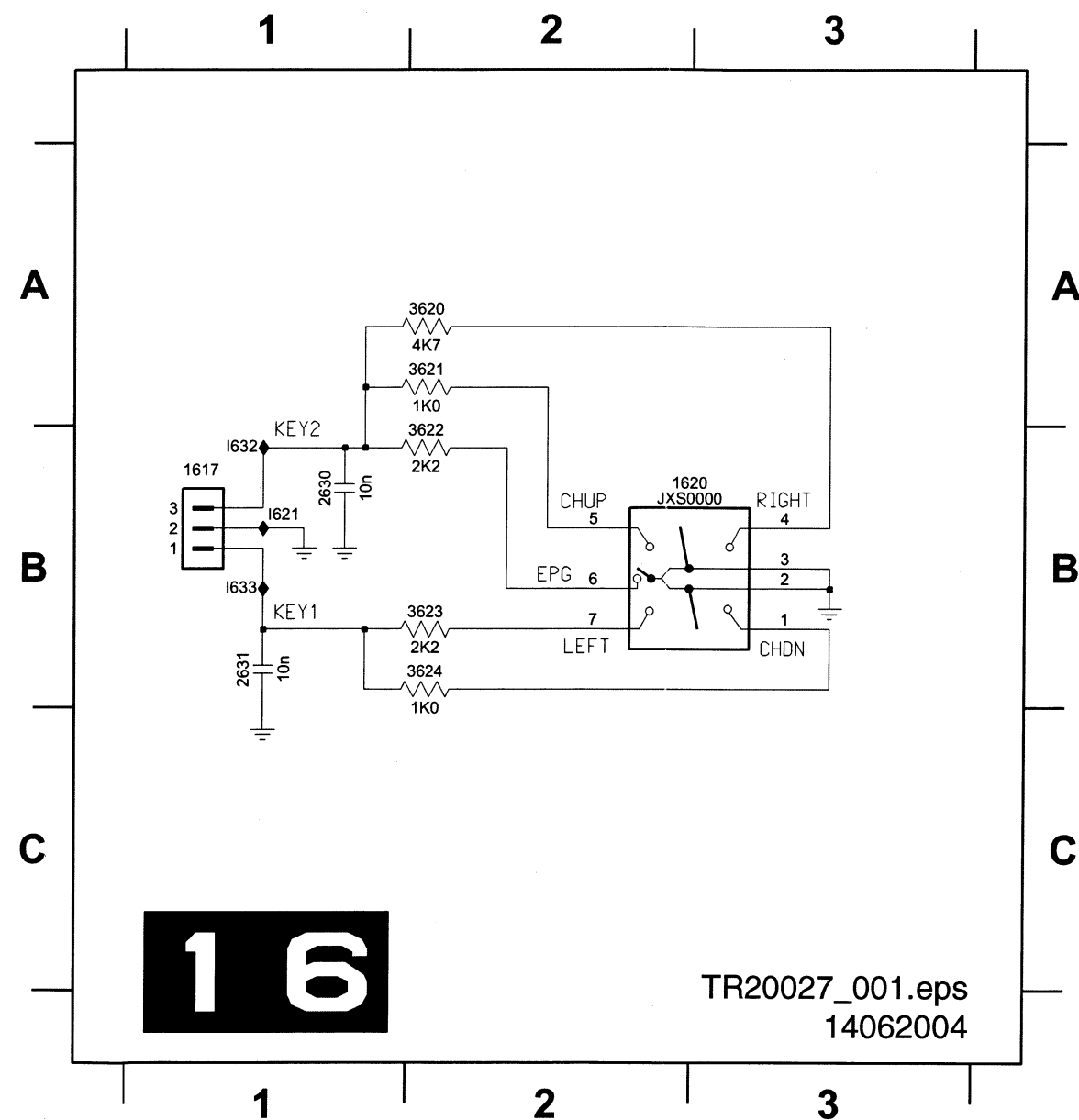


1122 A3
1990 A5

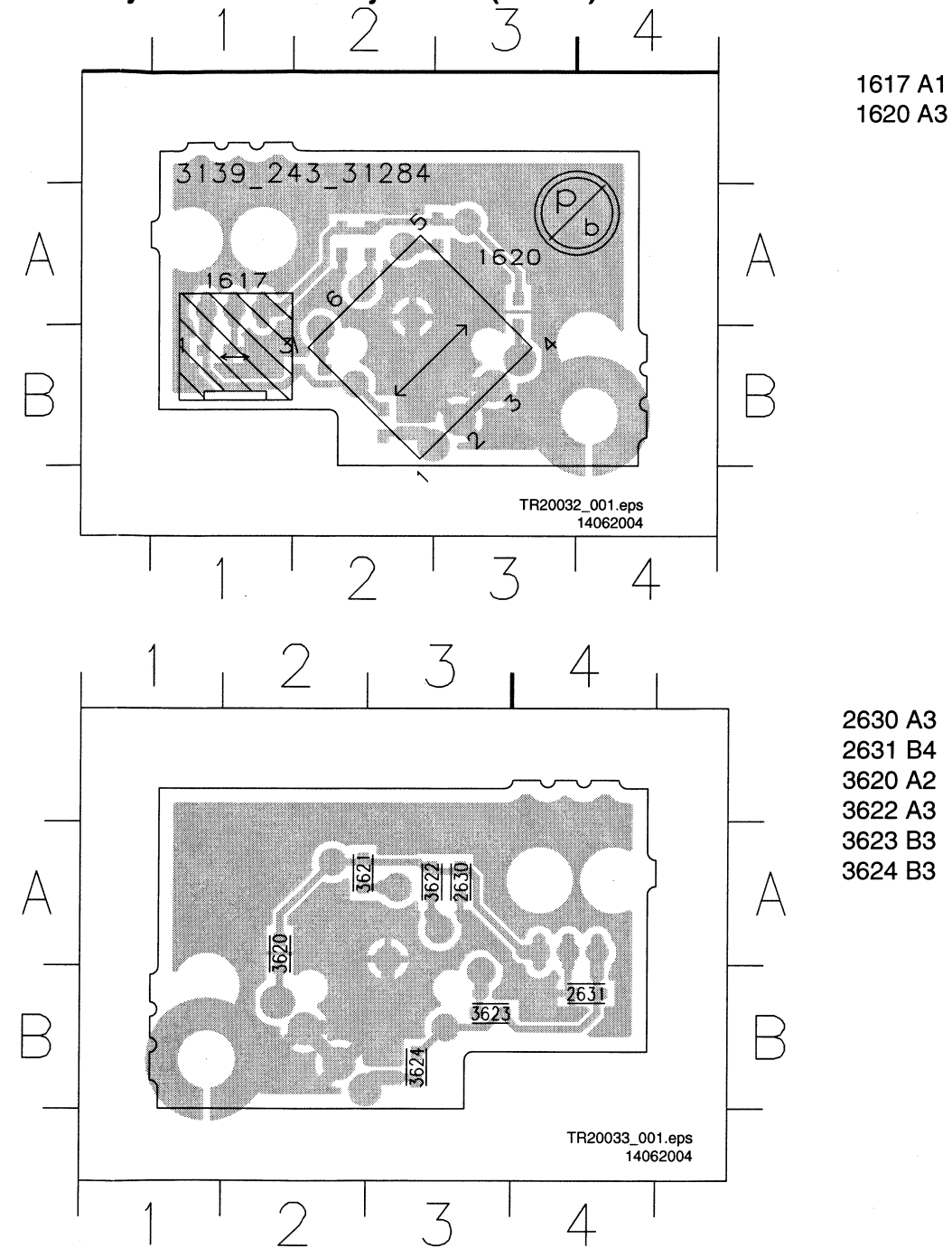
3251 A3

TR20054_001.eps
30062004

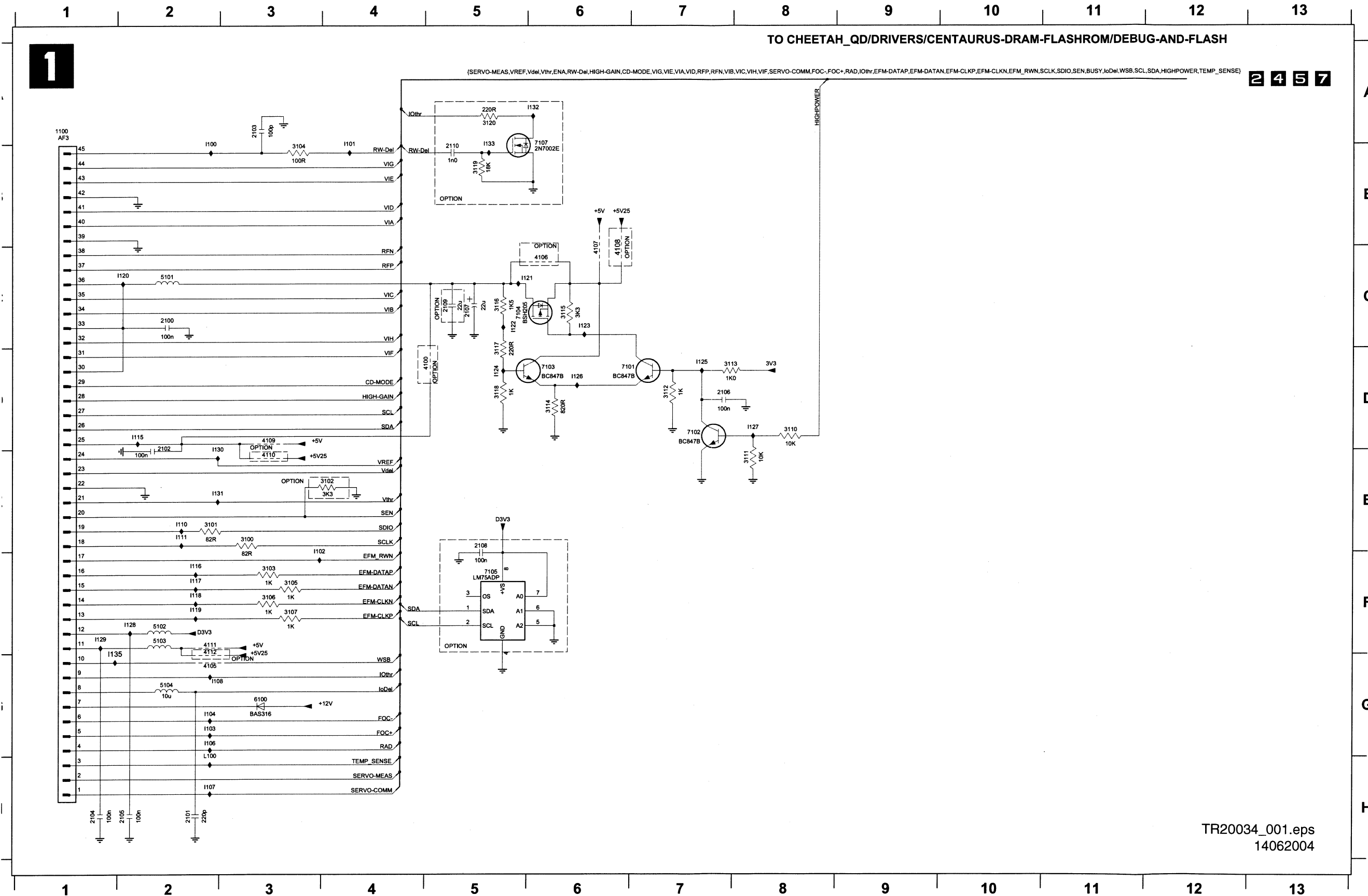
MOBO: 5-Way Switch (5WSW)



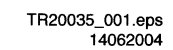
Layout MOBO: 5-Way Switch (5WSW)



FEBE: FE OPU Interface

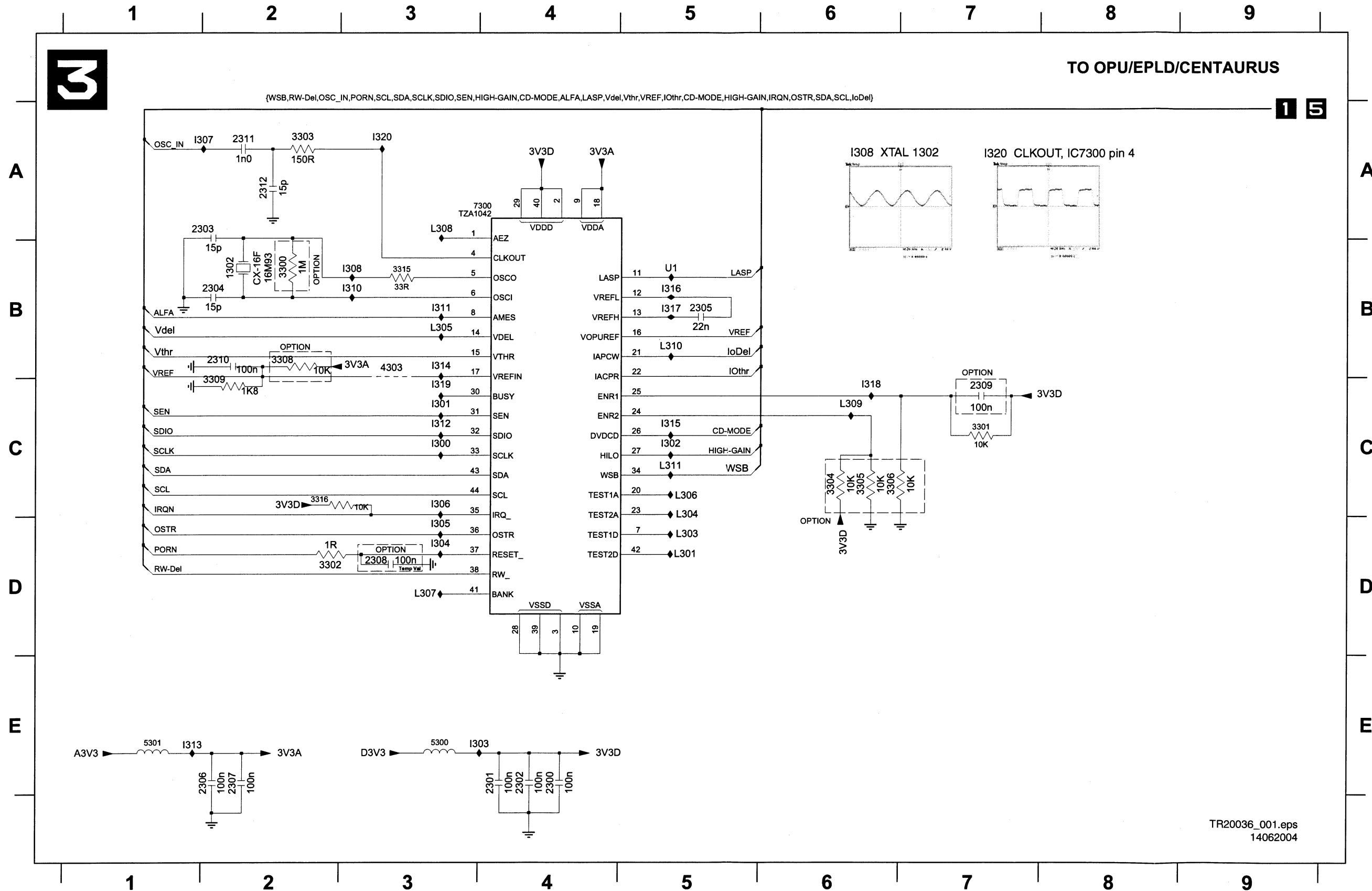


2



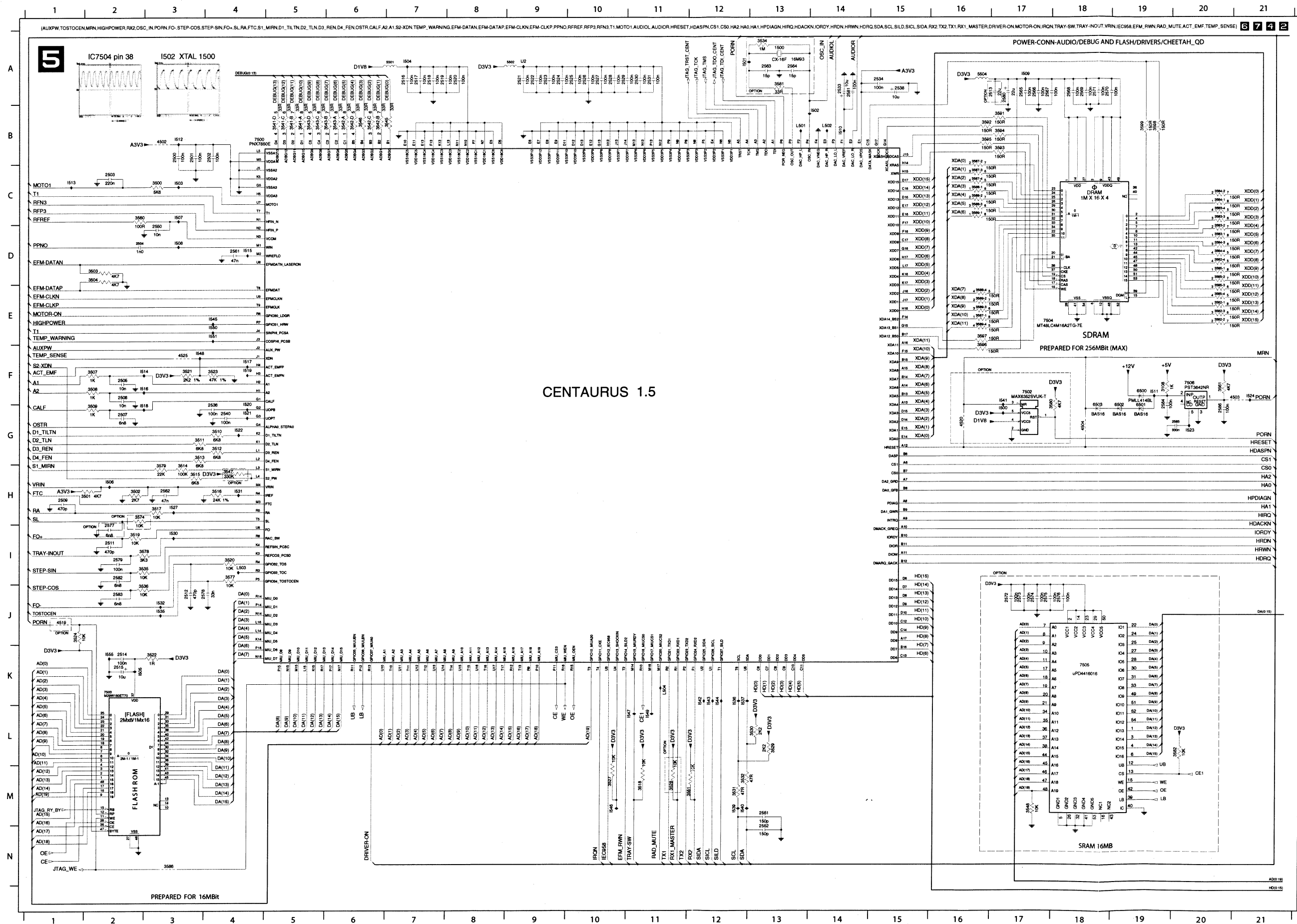
2200 B4
2205 B4
2209 B6
2210 B2
2211 B6
2212 B3
2213 E7
2214 E7
2215 E7
2217 E6
2218 E7
2219 B3
2221 C3
2223 F6
2228 D6
2229 G8
2230 G9
2231 G4
2232 I8
2233 I9
2234 I9
3200 B4
3201 B4
3202 B4
3204 C4
3206 E7
3207 C4
3208 G5
3209 G2
3210 H2
3211 H2
3212 H2
3213 F7
3215 C2
3216 C2
3217 F7
3218 G7
3219 I7
3220 G8
3221 G8
3222 G8
3223 H8
3224 G9
3225 I8
3226 H8
3227 I8
3228 I8
3229 I9
4200 H11
4201 H11
4202 C5
4203 C4
4204 C4
5202 B1
7201 C3
7202 G8
7203 I8
I201 B2
I202 C5
I203 C5
I204 C5
I205 C5
I206 C5
I207 C5
I208 C4
I209 C4
I212 C3
I214 C4
I215 D3
I216 C6
I217 D6
I218 D3
I219 D3
I221 D6
I222 D6
I223 C4
I224 D3
I225 C4
I226 C4
I227 E3
I228 E6
I229 E3
I231 E3
I232 F5
I233 E3
I234 E6
I235 F4
I237 E6
I238 E6
I239 E6
I240 G3
I241 F6
I242 B4
I243 B4
I244 F3
I246 F3
I247 F3
I248 F3
I250 H5
I251 H5
I252 H4
I253 F4
I254 G1
I257 G6
I258 G6
I259 I6
I260 I6
I261 H1
I262 H1
I263 H1
I264 E7

FEBE: FE Laconic Pre-processing

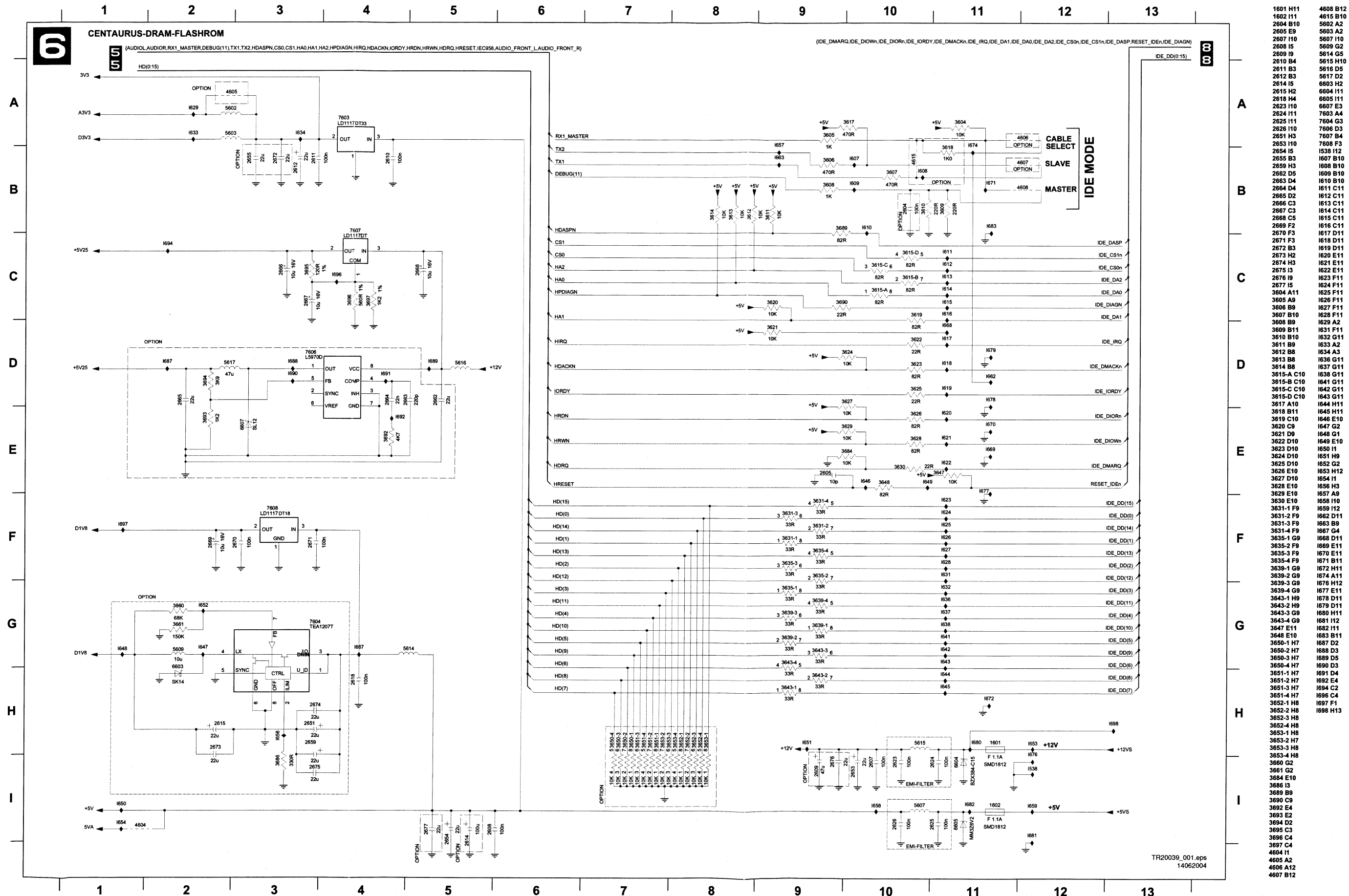


U1 B5
1302 B2
2300 E4
2301 E4
2302 E4
2303 A2
2304 B2
2305 B5
2306 E2
2307 E2
2308 D3
2309 C7
2310 B2
2311 A2
2312 A2
3300 B2
3301 C7
3302 D2
3303 A2
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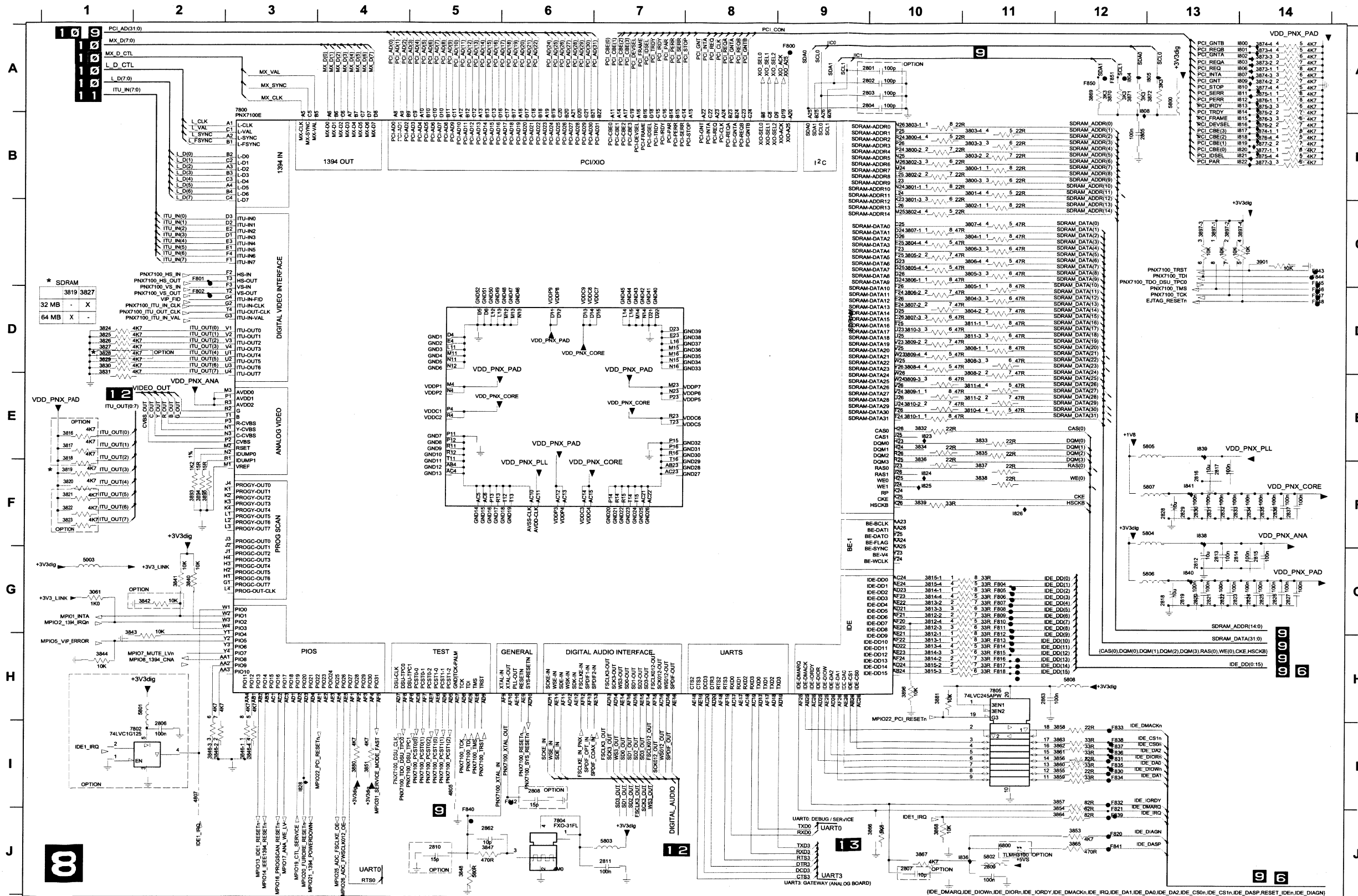


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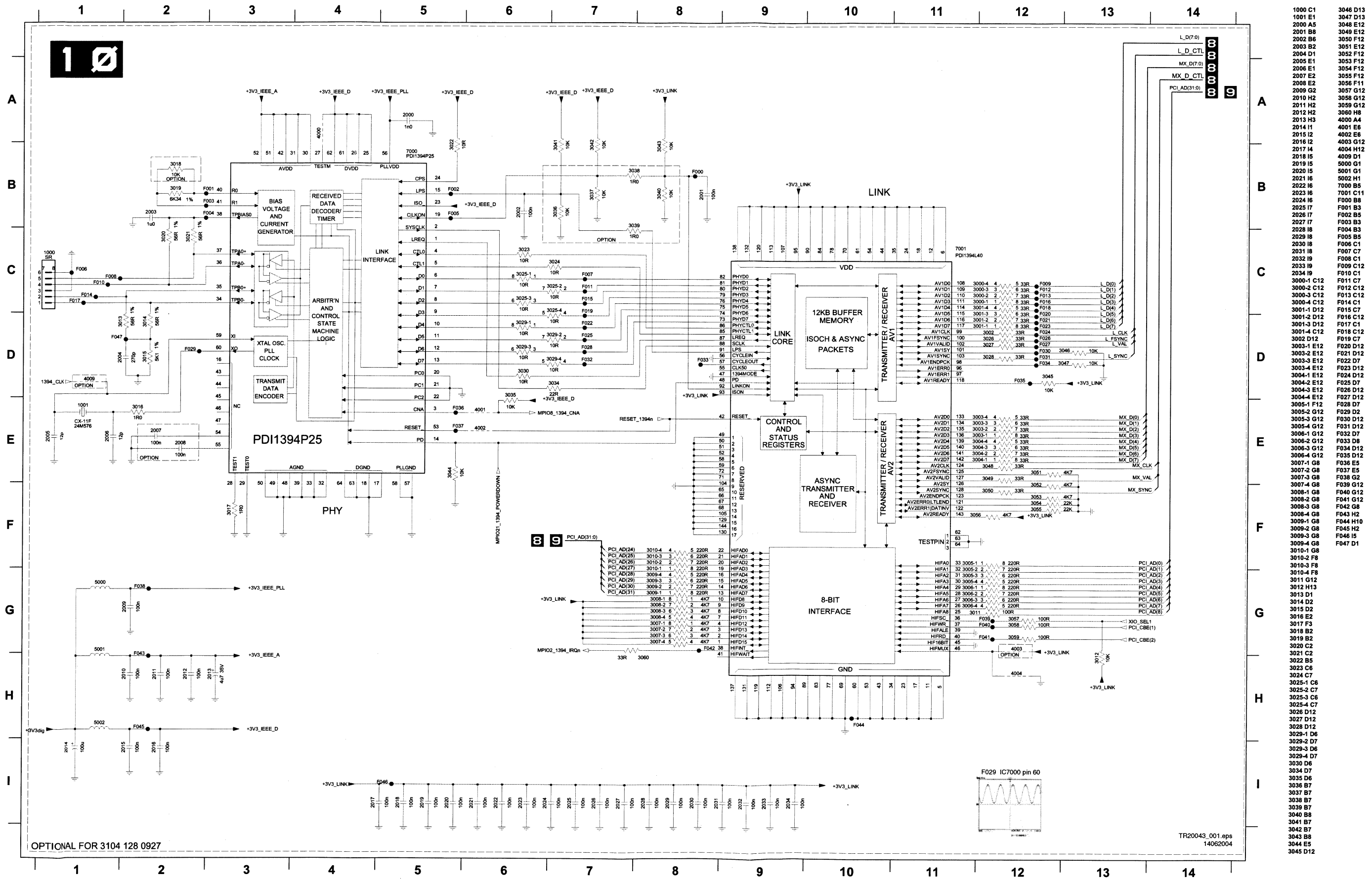
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FEBE: BE Chrysalis



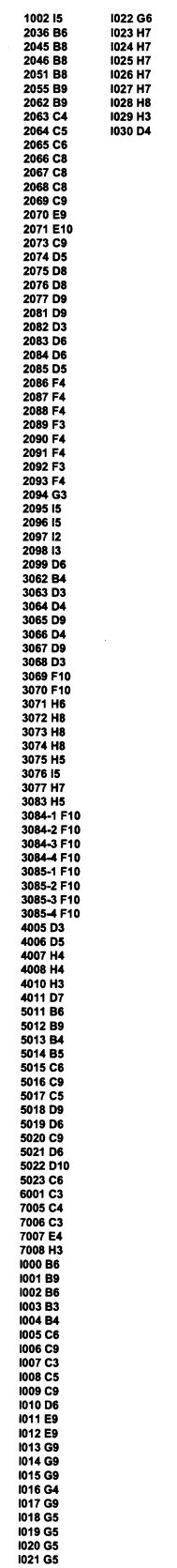
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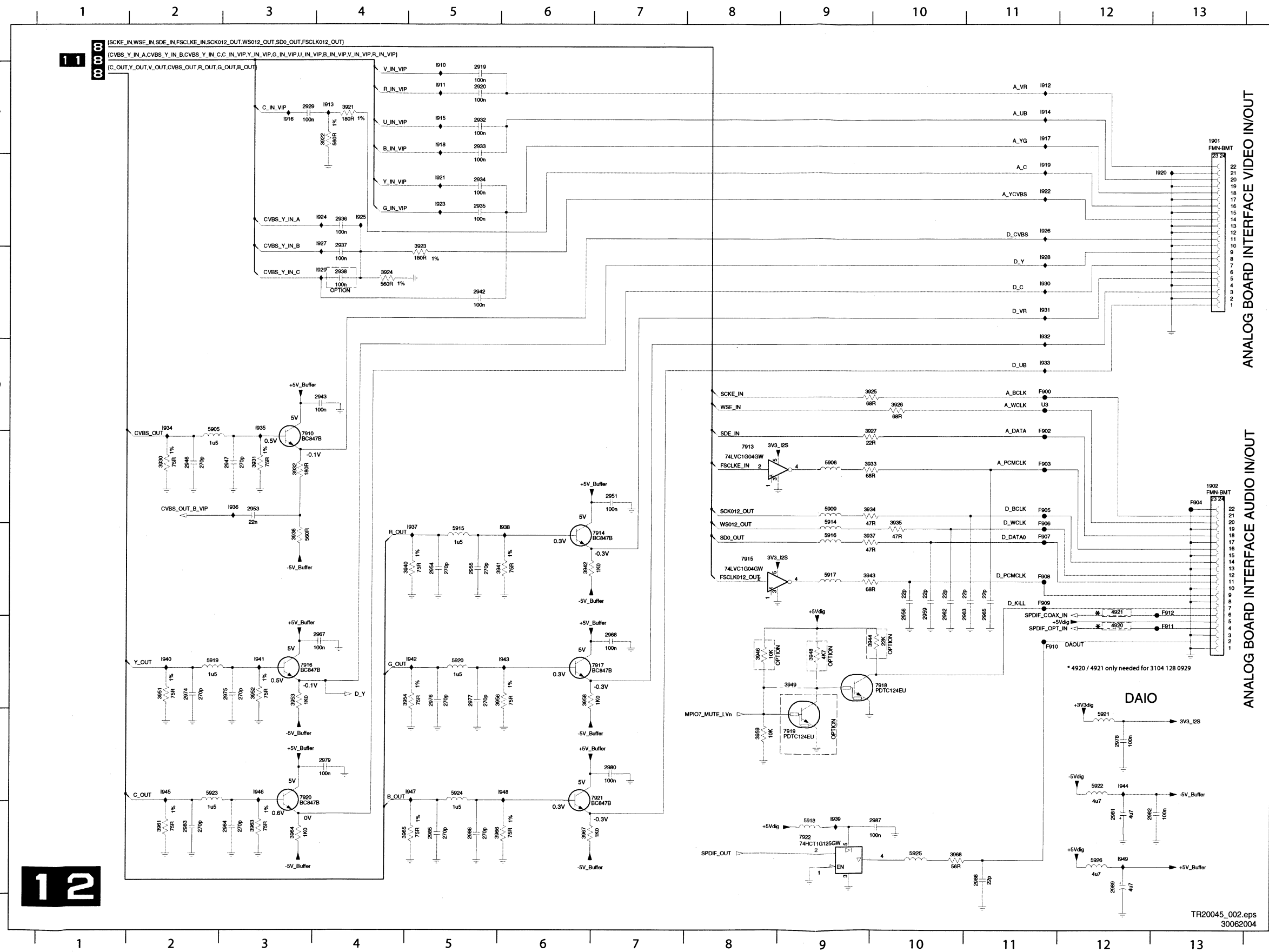


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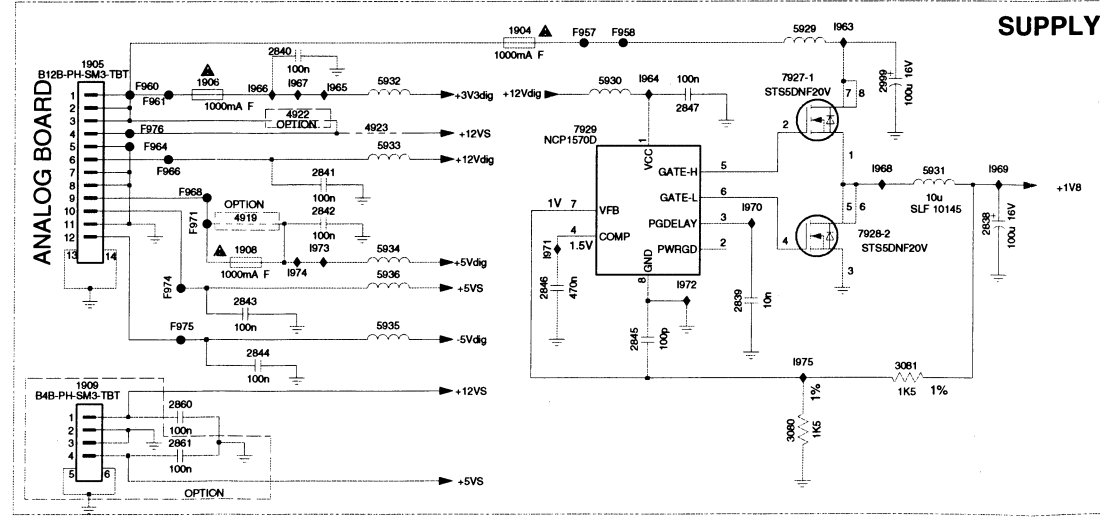
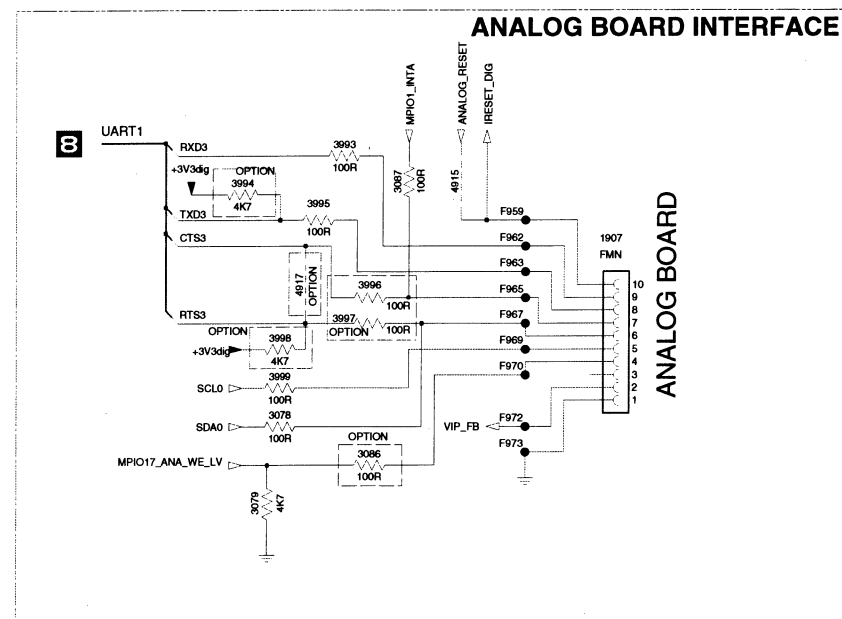


FEBE: BE Audio & Video In/Out



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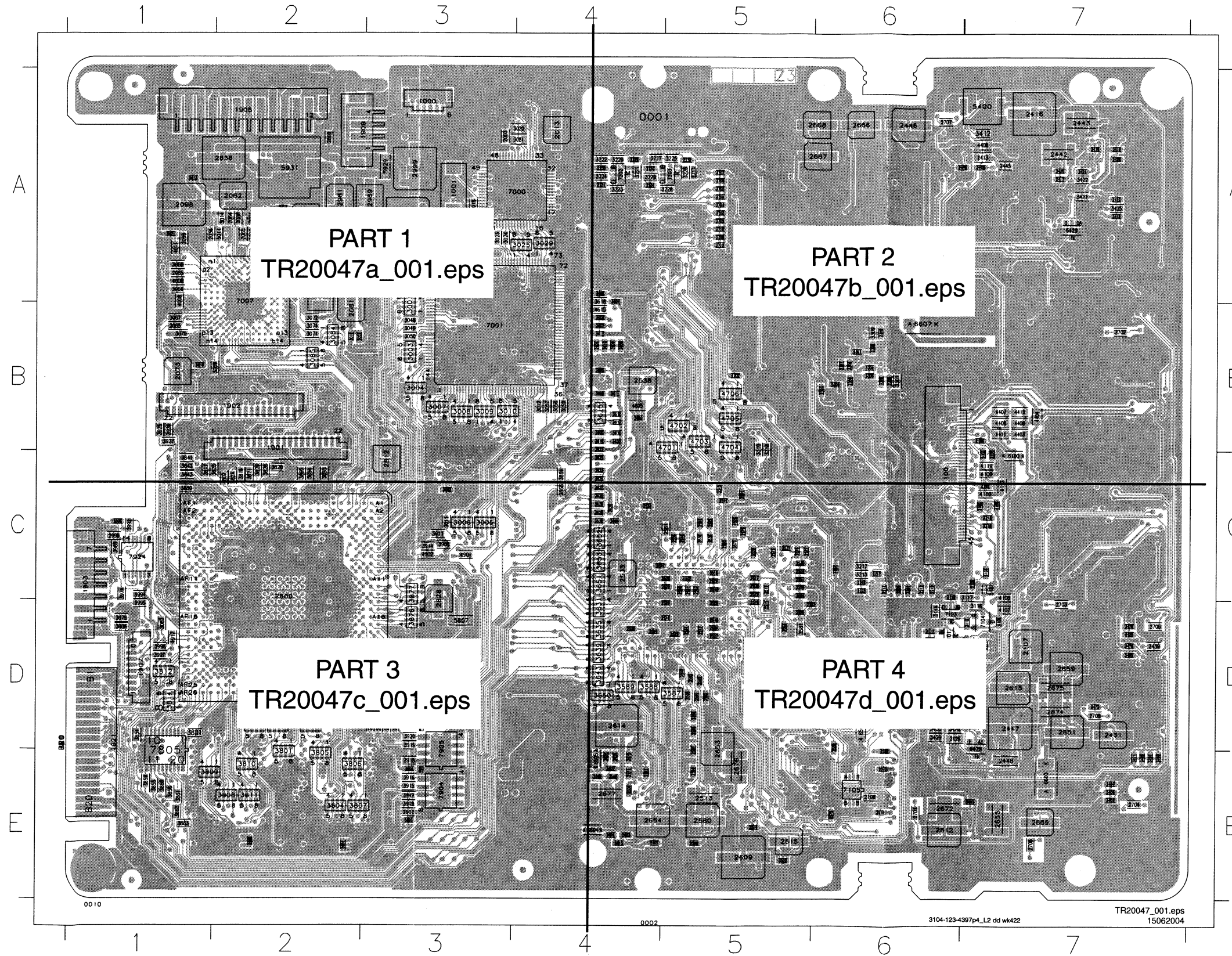
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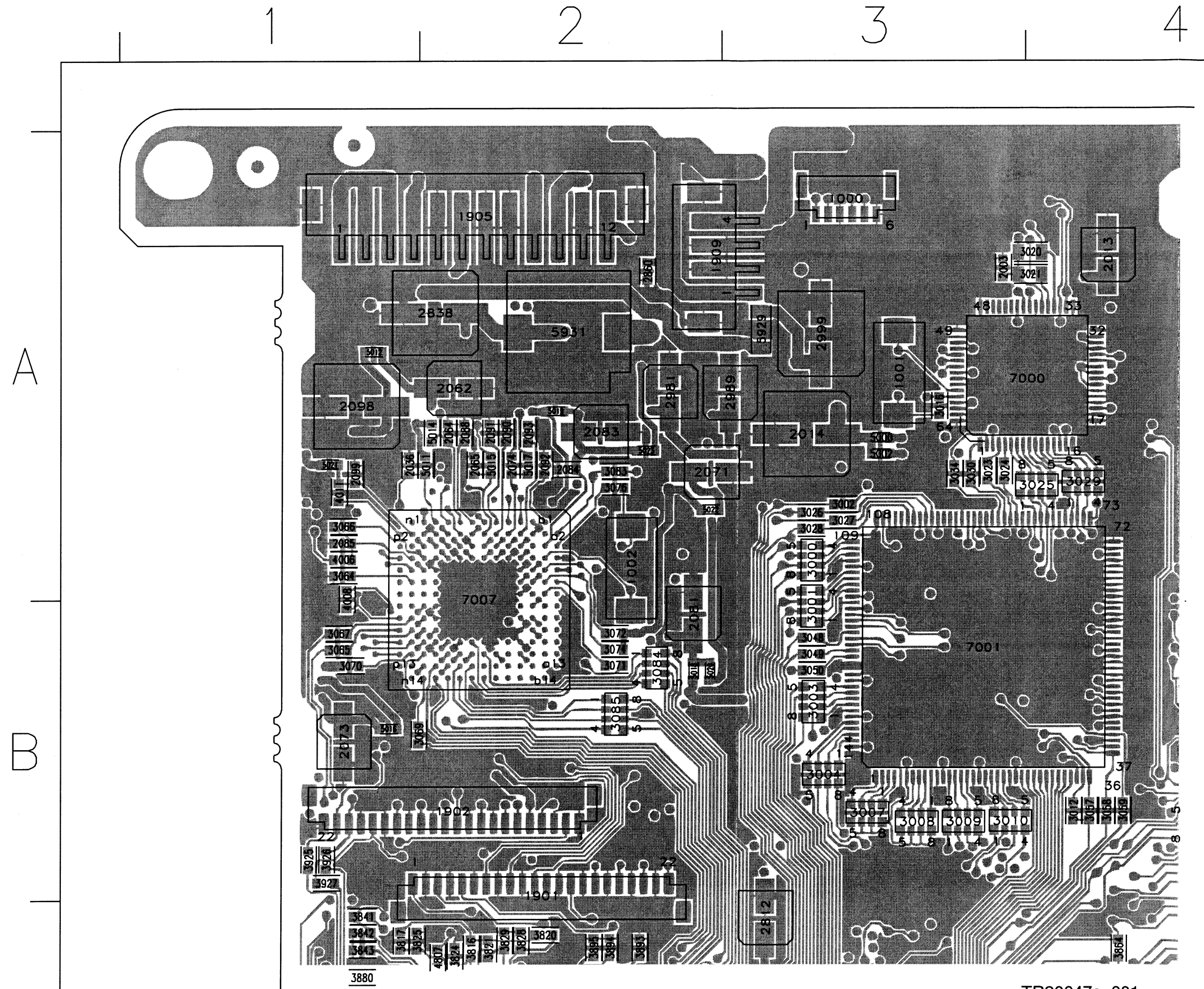
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Layout: FEBE Top View

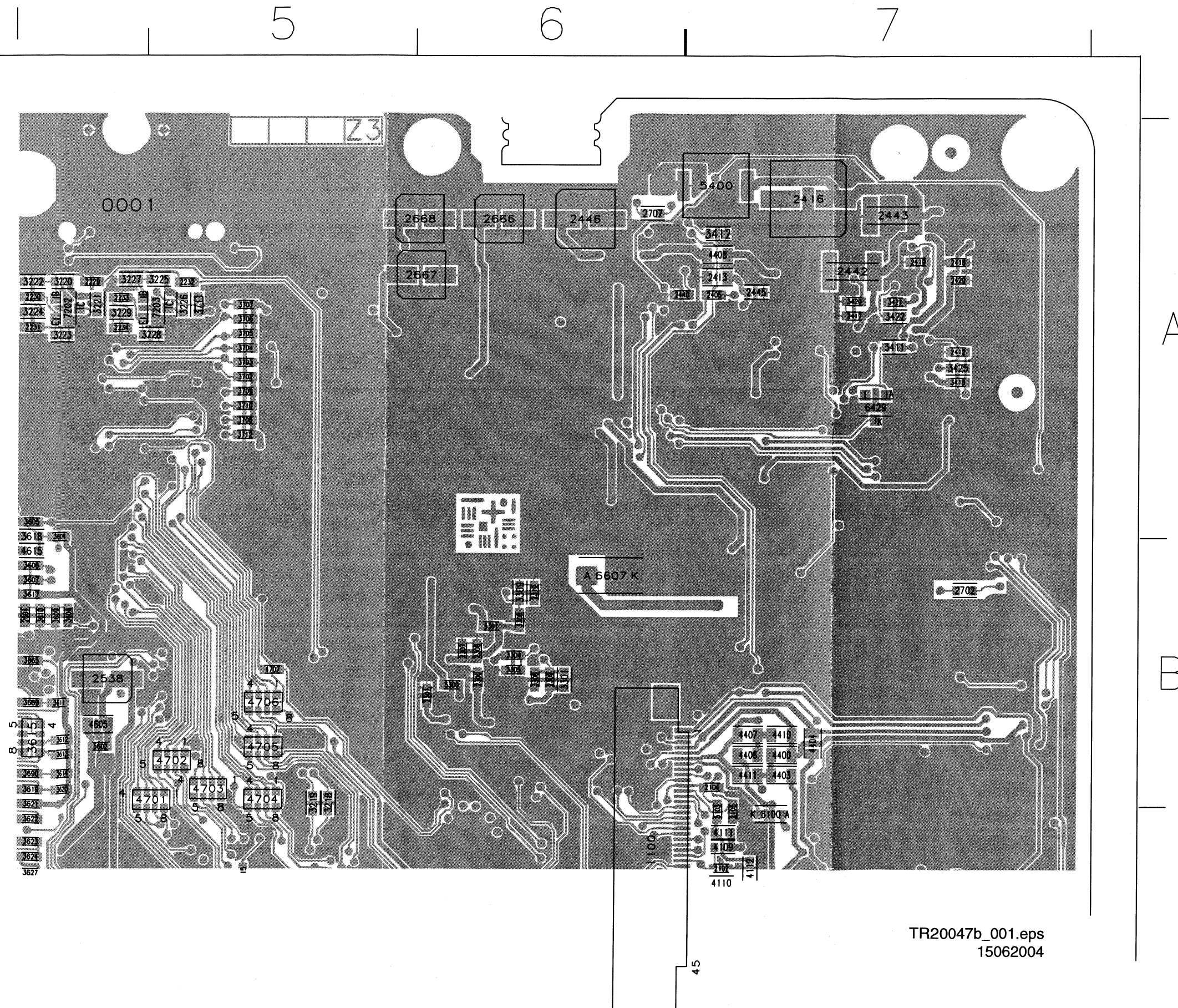


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1002	A2	2552	C5	3065	B1	3594	D5	3919	D3	7103	D6
1100	C6	2562	C5	3066	A1	3595	D5	3920	D3	7104	D7
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2013	A4	2570	E4	3079	D1	3607	B4	3995	D1	7904	E3
2014	A3	2571	E4	3082	C3	3608	B4	3996	D1	7905	E3
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2102	C7	2614	D4	3215	C7	3629	C4	4411	B7		
2103	C7	2615	D7	3216	C7	3630	C4	4422	D7		
2104	B7	2623	E4	3217	C6	3631	D4	4502	C5		
2105	C7	2624	E4	3218	C6	3632	D4	4503	D6		
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2211	C6	2653	D5	3222	A4	3651	C4	4525	C5		
2212	C6	2654	E4	3223	A4	3652	C4	4604	C6		
2217	C6	2655	E7	3224	A4	3653	C4	4605	B5		
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2219	C6	2666	A6	3226	A5	3689	B4	4701	B5		
2223	C6	2667	A6	3227	A4	3690	B4	4702	B5		
2229	A4	2668	A6	3228	A5	3702	A5	4703	B5		
2230	A4	2669	E7	3229	A4	3703	A5	4704	B5		
2231	A4	2672	E6	3301	B6	3704	A5	4705	B5		
2232	A5	2674	D7	3304	B6	3705	A5	4706	B5		
2233	A4	2675	D7	3305	B6	3706	A5	4707	B5		
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2310	B6	2704	E7	3412	A7	3800	D2	5011	A2		
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2407	E7	2706	E7	3420	A7	3802	D2	5014	A2		
2412	A7	2707	A6	3421	A7	3803	D2	5015	A2		
2413	A7	2801	D3	3422	A7	3804	E2	5016	B1		
2416	A7	2802	D3	3425	A7	3805	E2	5017	A2		
2417	A7	2803	D3	3426	D6	3806	E2	5018	B2		
2418	A7	2804	D3	3427	D7	3807	E2	5019	A2		
2419	A7	2807	D3	3428	D7	3808	E2	5020	E2		
2420	A7	2809	D3	3429	D6	3809	E1	5021	A1		
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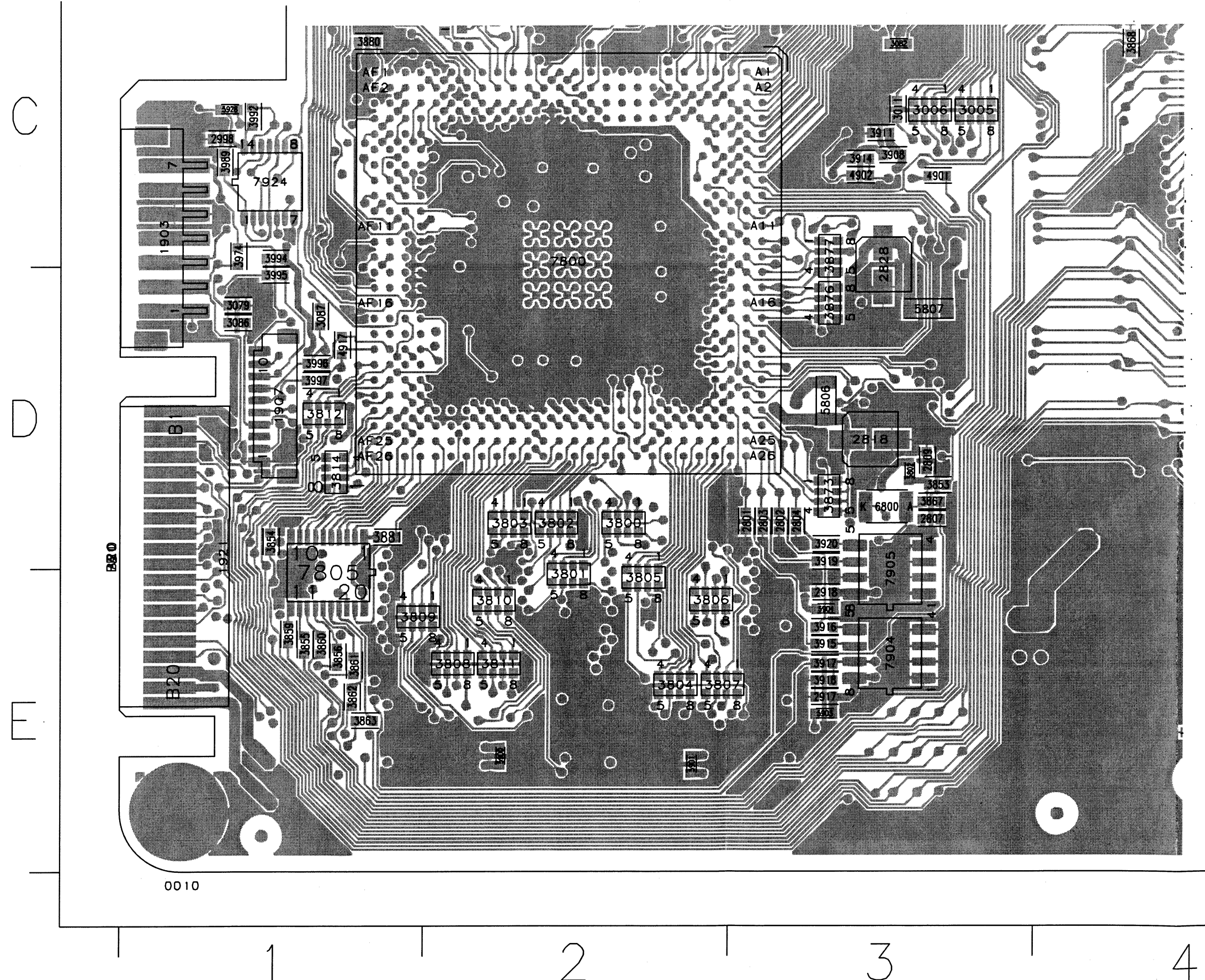
Layout: FEBE Top View Part 1



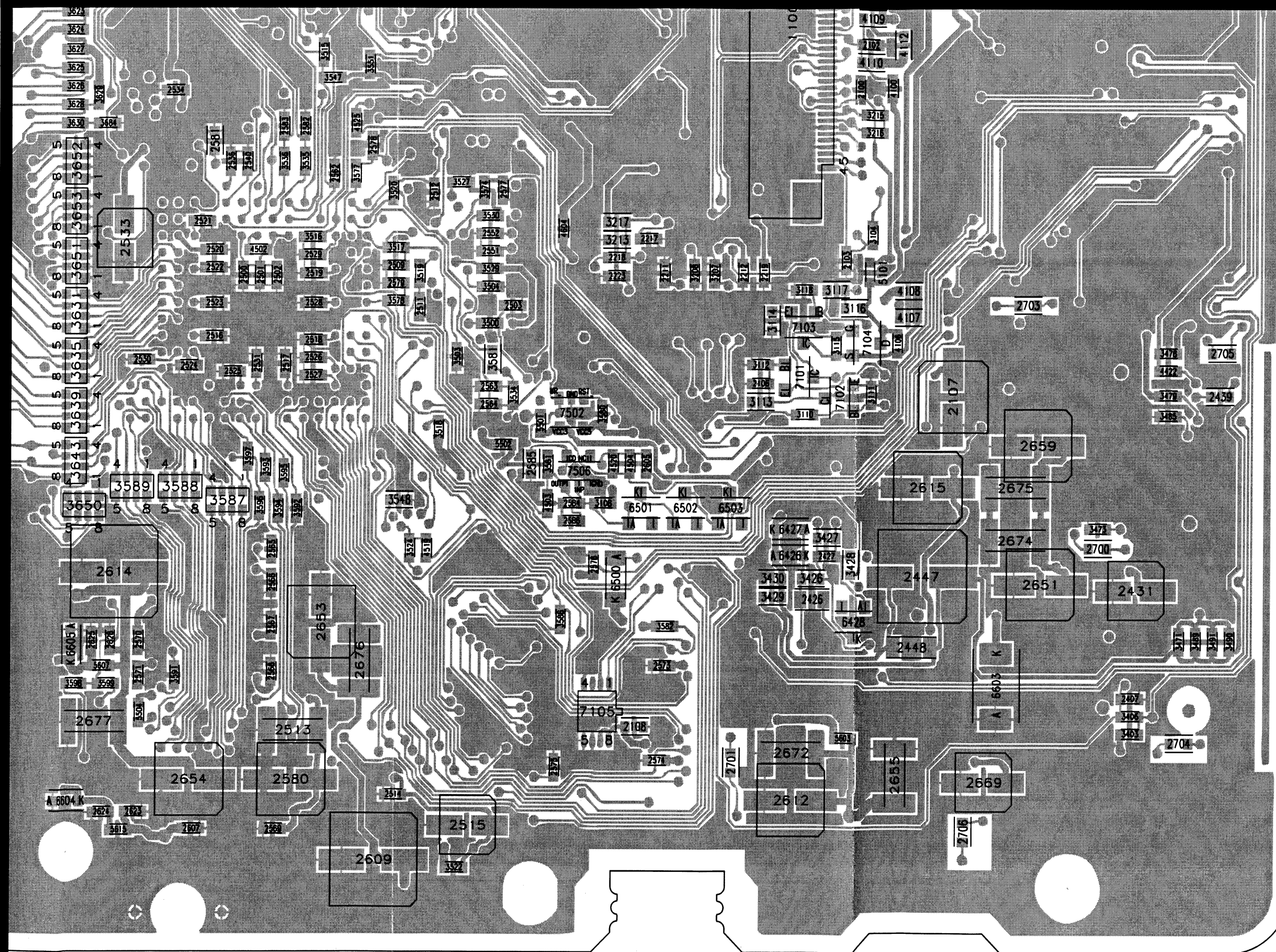
Layout: FEBE Top View Part 2



Layout: FEBE Top View Part 3



Layout: FEBE Top View Part 4

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3104-123-4397p4_L2 dd wk422

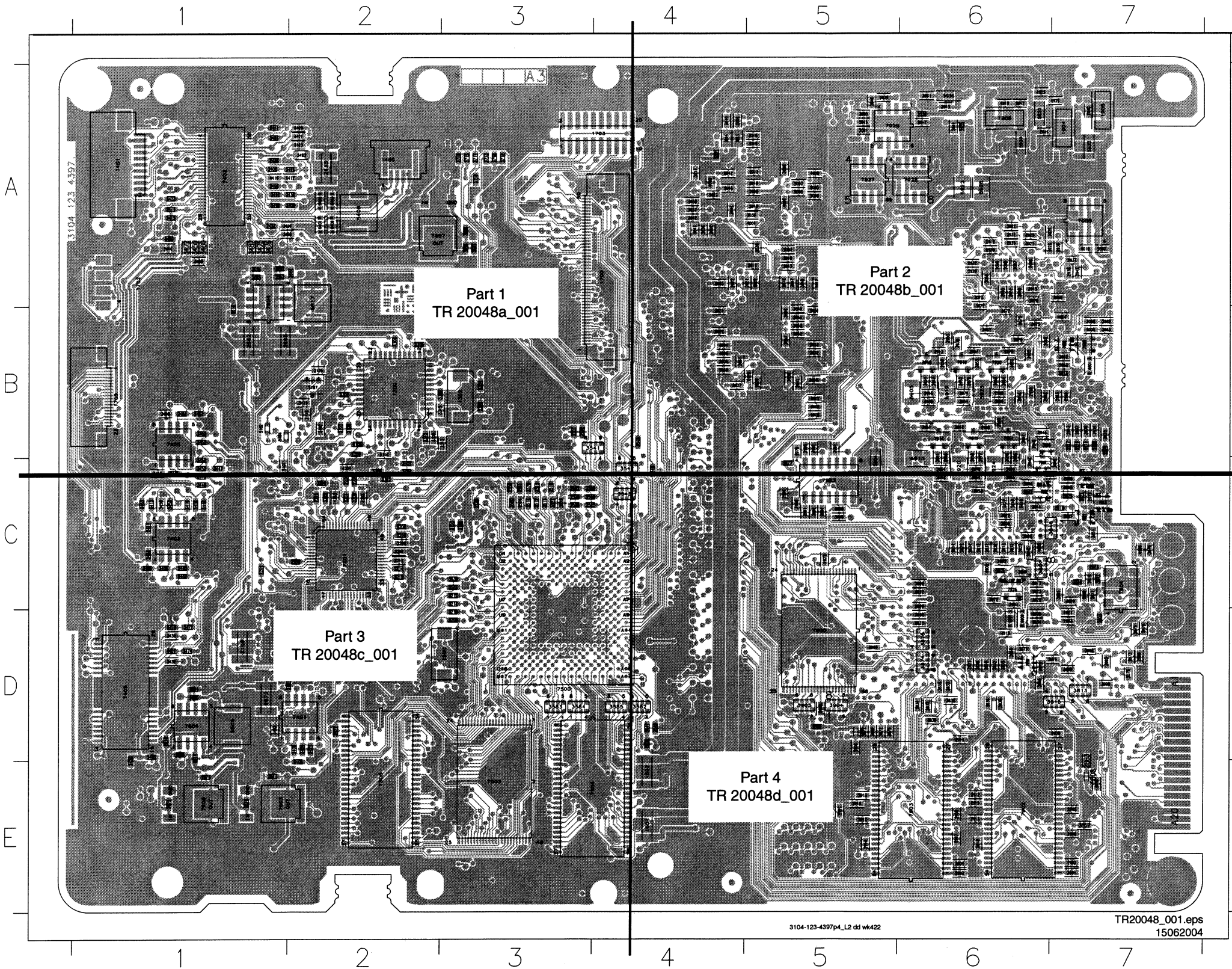
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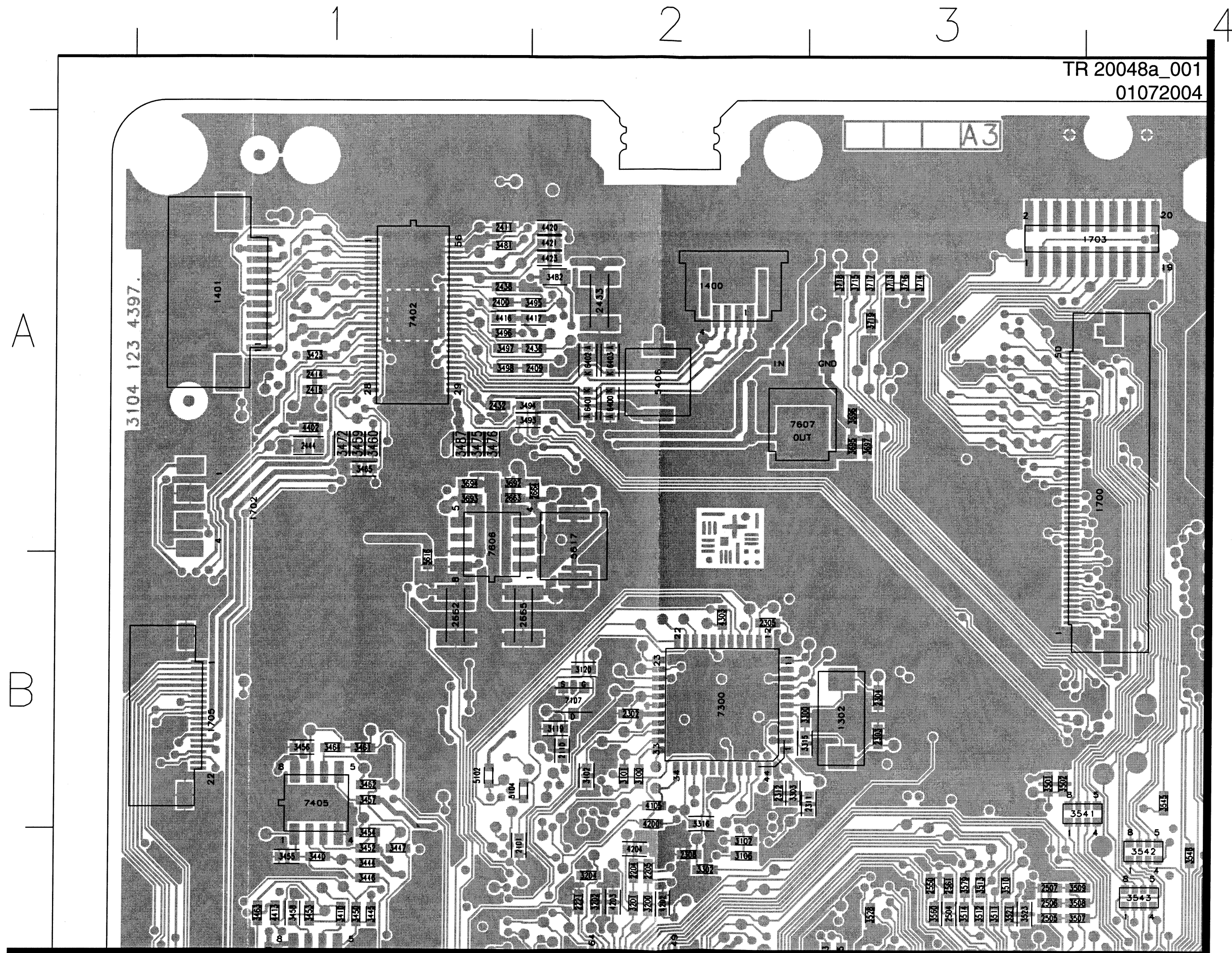
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Layout: FEBE Bottom View



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1401 A1	2432 A1	2937 A7	3300 B2	3719 A3	3993 D7	7005 B7
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1601 E4	2434 D1	2942 A7	3303 B2	3815 D7	3999 D7	7008 A7
1602 E4	2435 D1	2943 B6	3315 B2	3818 C6	4000 A4	7107 B2
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1702 A1	2438 A1	2947 B6	3404 D2	3822 C6	4002 A5	7300 B2
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1705 B1	2444 A1	2953 B6	3410 C1	3826 C6	4004 B4	7402 A1
1904 A7	2504 C3	2954 C6	3423 A1	3827 C6	4005 B7	7403 C1
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1908 A6	2506 C3	2956 B6	3444 C1	3831 C6	4009 A5	7409 D1
2000 A5	2507 C3	2959 B6	3445 C1	3832 D6	4010 A7	7500 D3
2001 A5	2550 C3	2962 B6	3446 C1	3833 D6	4105 B2	7503 E3
2002 A4	2561 C3	2963 B7	3447 C1	3834 D6	4200 B2	7504 E4
2004 A4	2572 D2	2965 B7	3450 C1	3835 D6	4201 C1	7505 E2
2005 A5	2608 D4	2967 B6	3452 C1	3836 D6	4202 C2	7603 E1
2006 A5	2610 E1	2968 B6	3453 C1	3837 D6	4203 C2	7604 D1
2007 A5	2611 E1	2974 B6	3454 C1	3838 D6	4204 C2	7606 A1
2008 A5	2618 D1	2975 B6	3455 C1	3839 D6	4303 B2	7607 A2
2009 A5	2662 B1	2976 C6	3456 B1	3840 C6	4402 A1	7608 E1
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2011 A5	2664 A2	2978 C7	3458 C1	3846 C7	4416 A1	7804 C7
2012 A4	2665 B1	2979 B6	3459 A1	3847 C7	4417 A2	7900 D5
2015 A4	2670 E1	2980 B6	3460 A1	3848 C7	4419 D1	7902 E6
2016 A5	2671 E1	2982 B6	3461 B1	3851 C7	4420 A2	7903 E6
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2020 A5	2808 C7	2986 C6	3465 A1	3869 D5	4606 B5	7915 C7
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2032 B5	2823 C6	3017 A4	3487 A1	3913 E5	4922 A7	7917 C5
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2034 B5	2825 C6	3019 A5	3492 D1	3922 A6	4925 C5	
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2046 A6	2827 C6	3035 A5	3494 A1	3924 A6	5003 A5	
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2095 A6	2846 A5	3055 B5	3528 C3	3951 B6	5902 D5	
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2101 C1	2862 C7	3061 B4	3541 B3	3954 C6	5909 B7	
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2304 B3	2912 E5	3105 C3	3661 D1	3972 C6	5927 C5	
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Layout: FEBE Bottom View Part 1

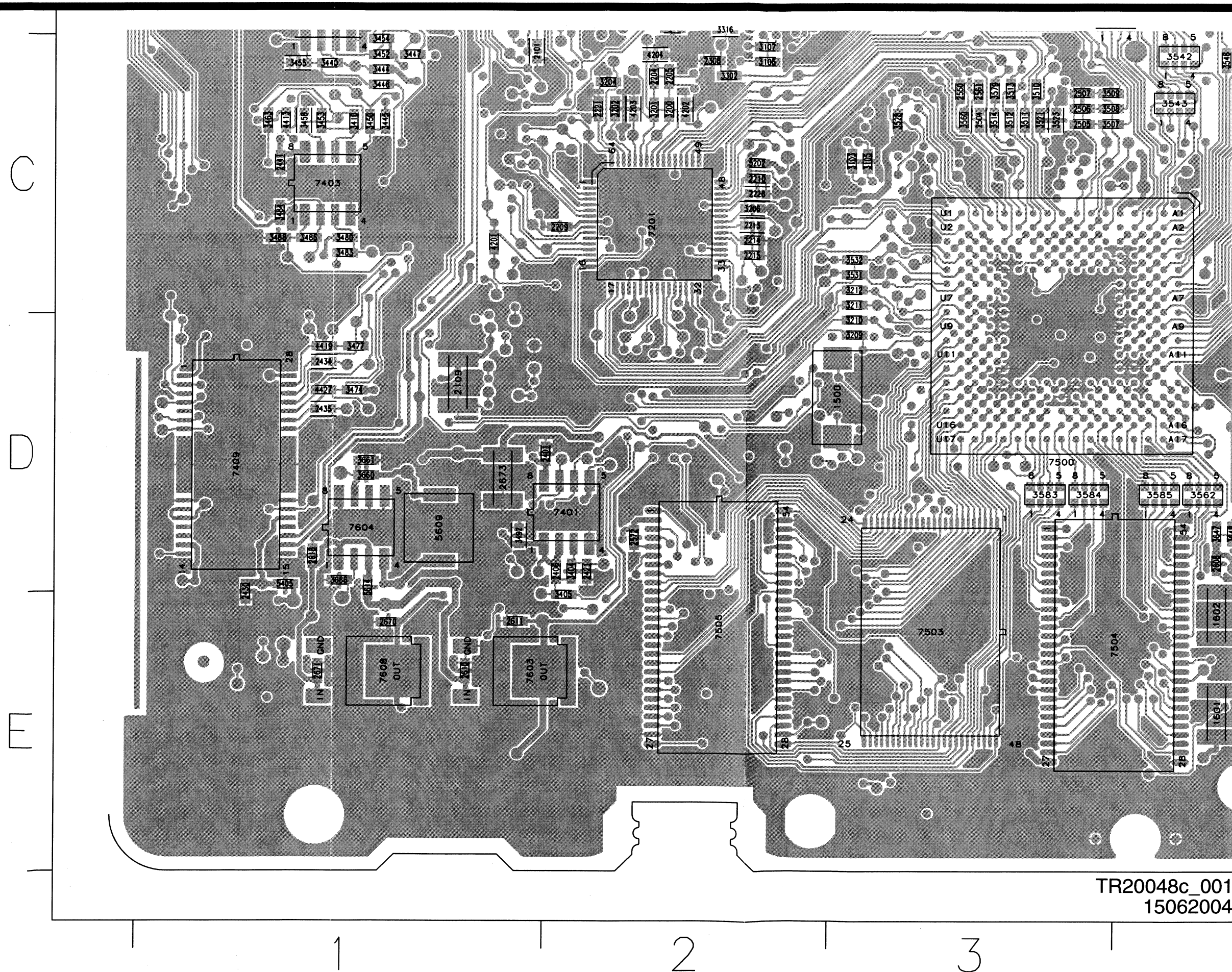


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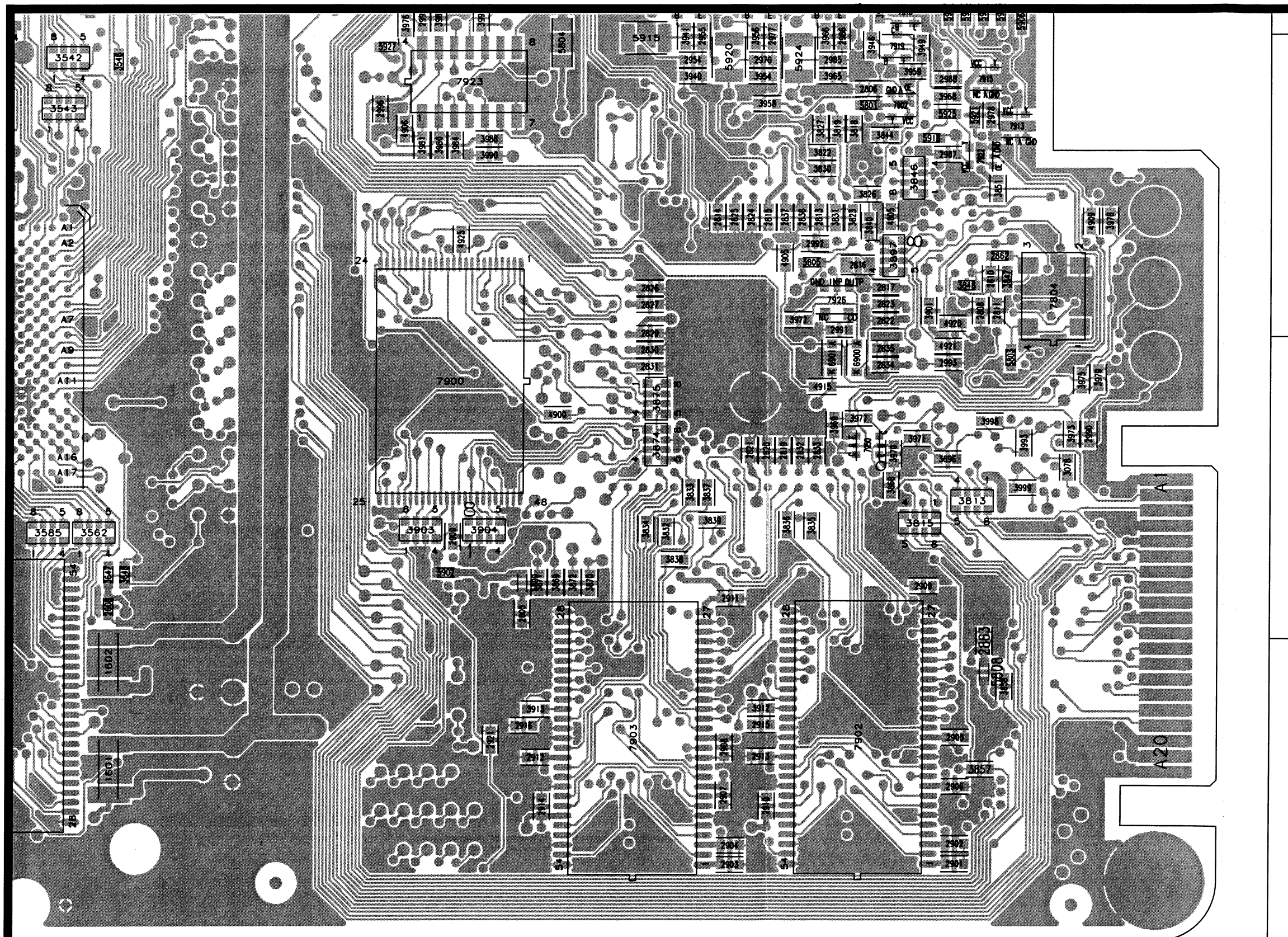


TR 20048b_001
01072004

Layout: FEBE Bottom View Part 3

TR20048c_001
15062004

Layout: FEBE Bottom View Part 4

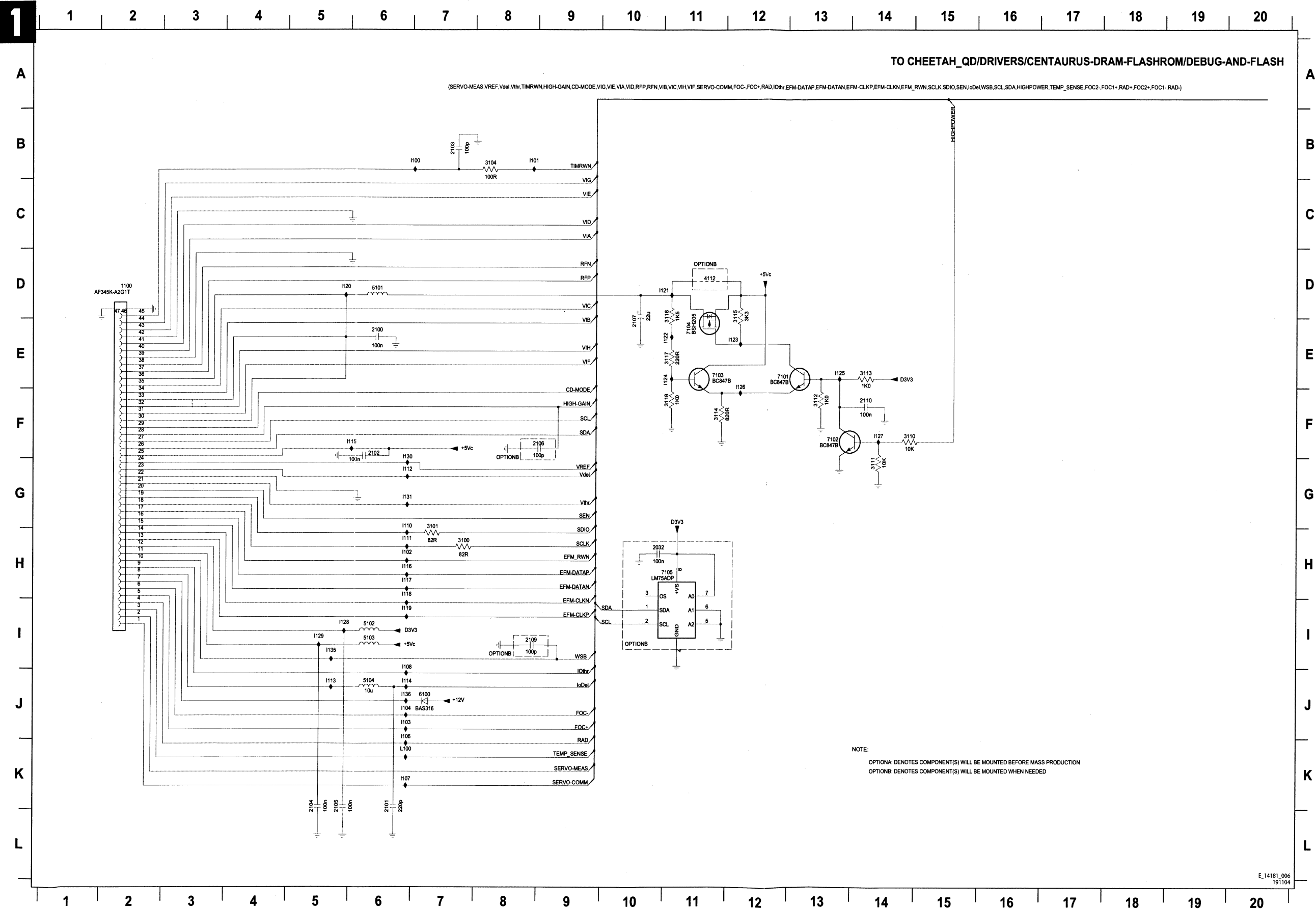


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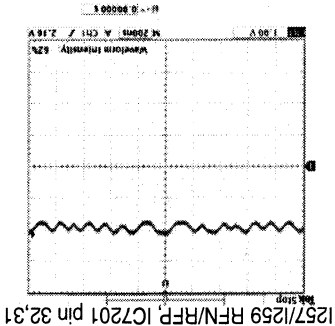
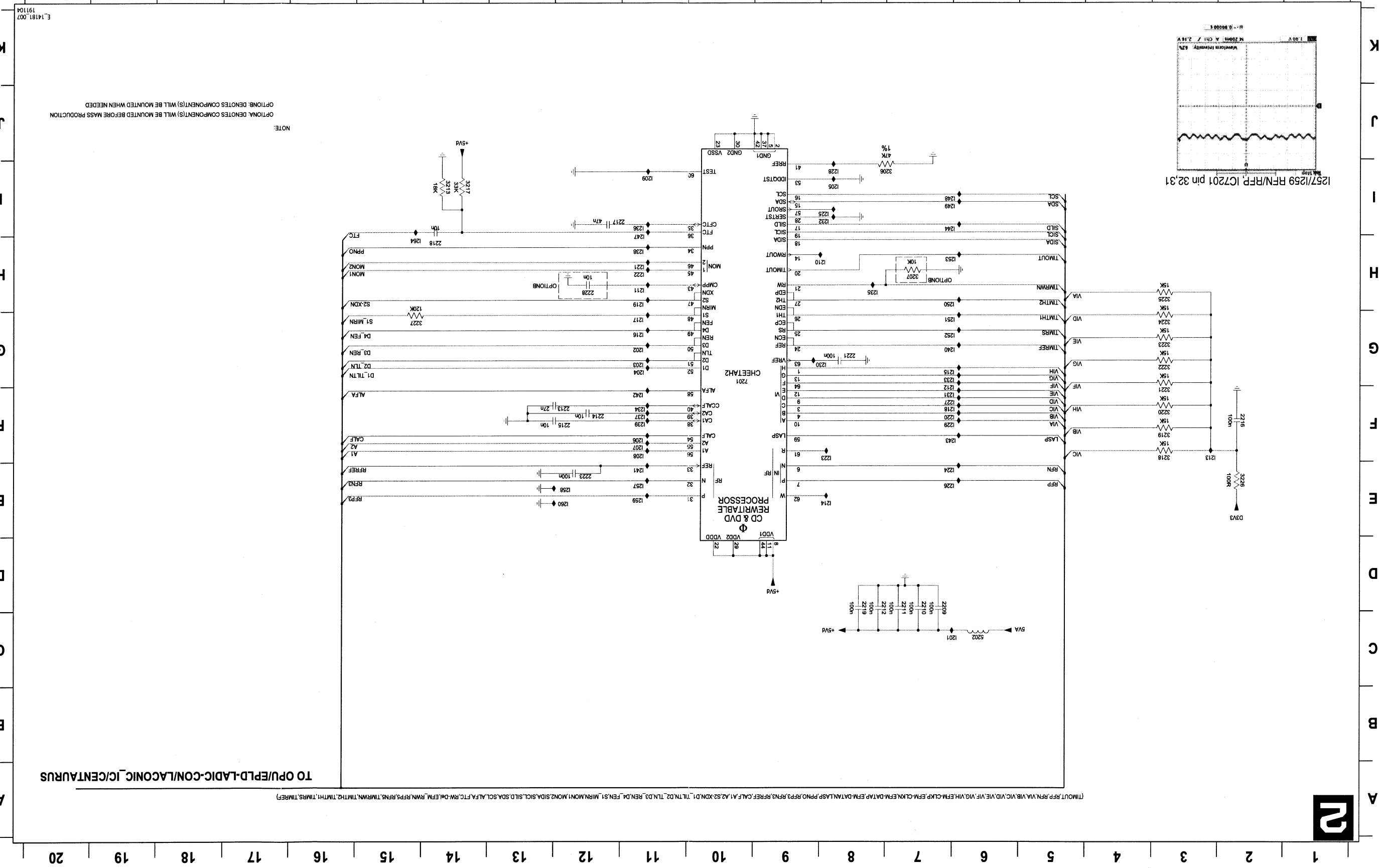
LECO: Fe Opu Interface

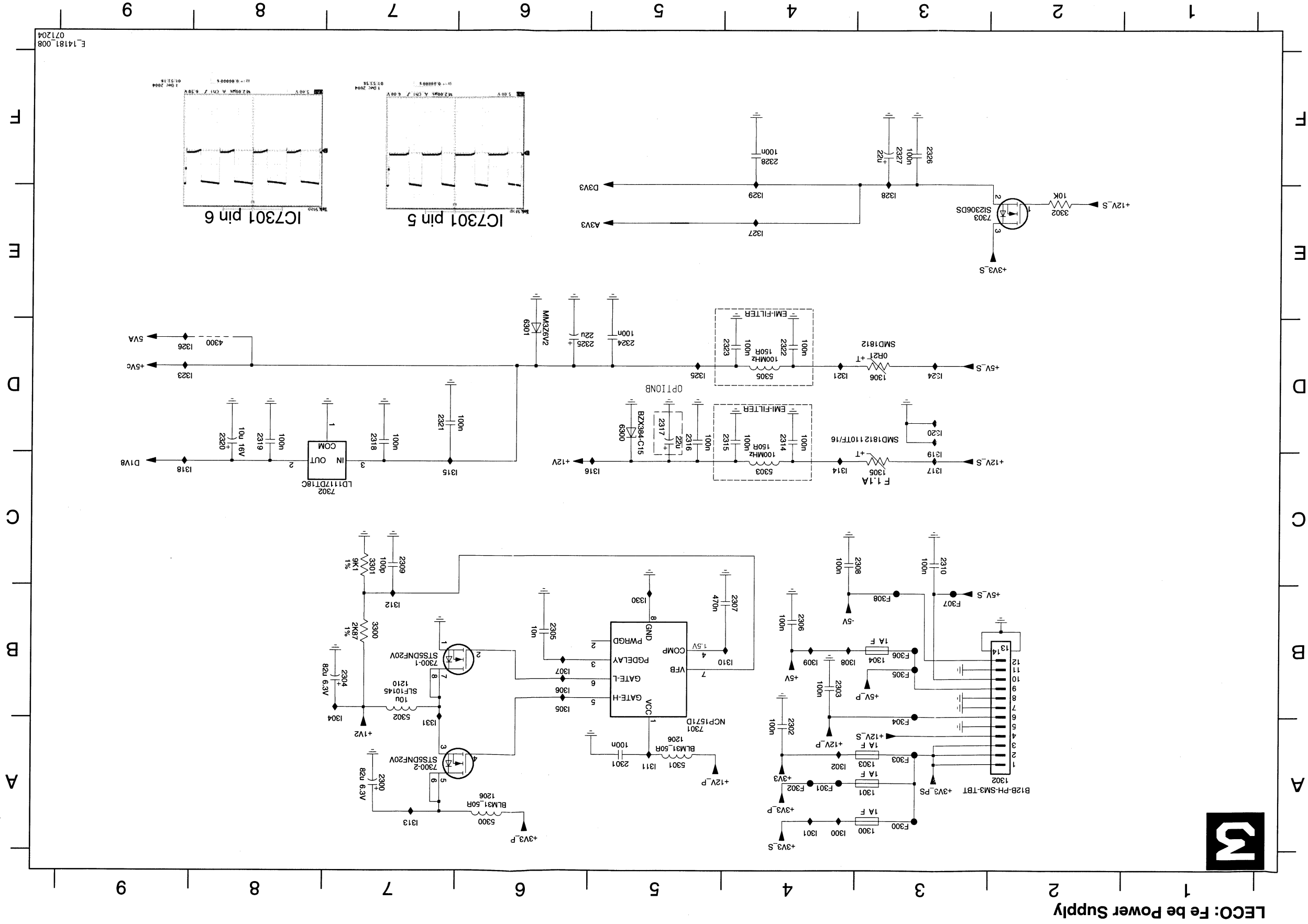
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2032 H10 2101 K6 2103 B7 2105 K5 2107 E10 2110 F14 3101 H7 3110 F14 3112 F13 3114 F11 3116 D11 3118 F11 5101 D6 5103 I6 6100 J7 7102 F13 7104 E11 I100 B7 I102 H6 I104 J6 I107 K6 I110 G6 I112 G6 I114 J6 I116 H6 I118 H6 I120 D5 I122 E11 I124 E11 I126 E12 I128 I5 I130 F6 I135 I5 L100 K6



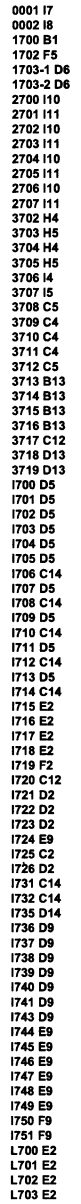
LECO: Fe Pre-Processing

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NOTE:

OPTIONA: DENOTES COMPONENT(S) WILL BE MOUNTED BEFORE MASS PRODUCTION

OPTIONB: DENOTES COMPONENT(S) WILL BE MOUNTED WHEN NEEDED

E_14181_012
191104

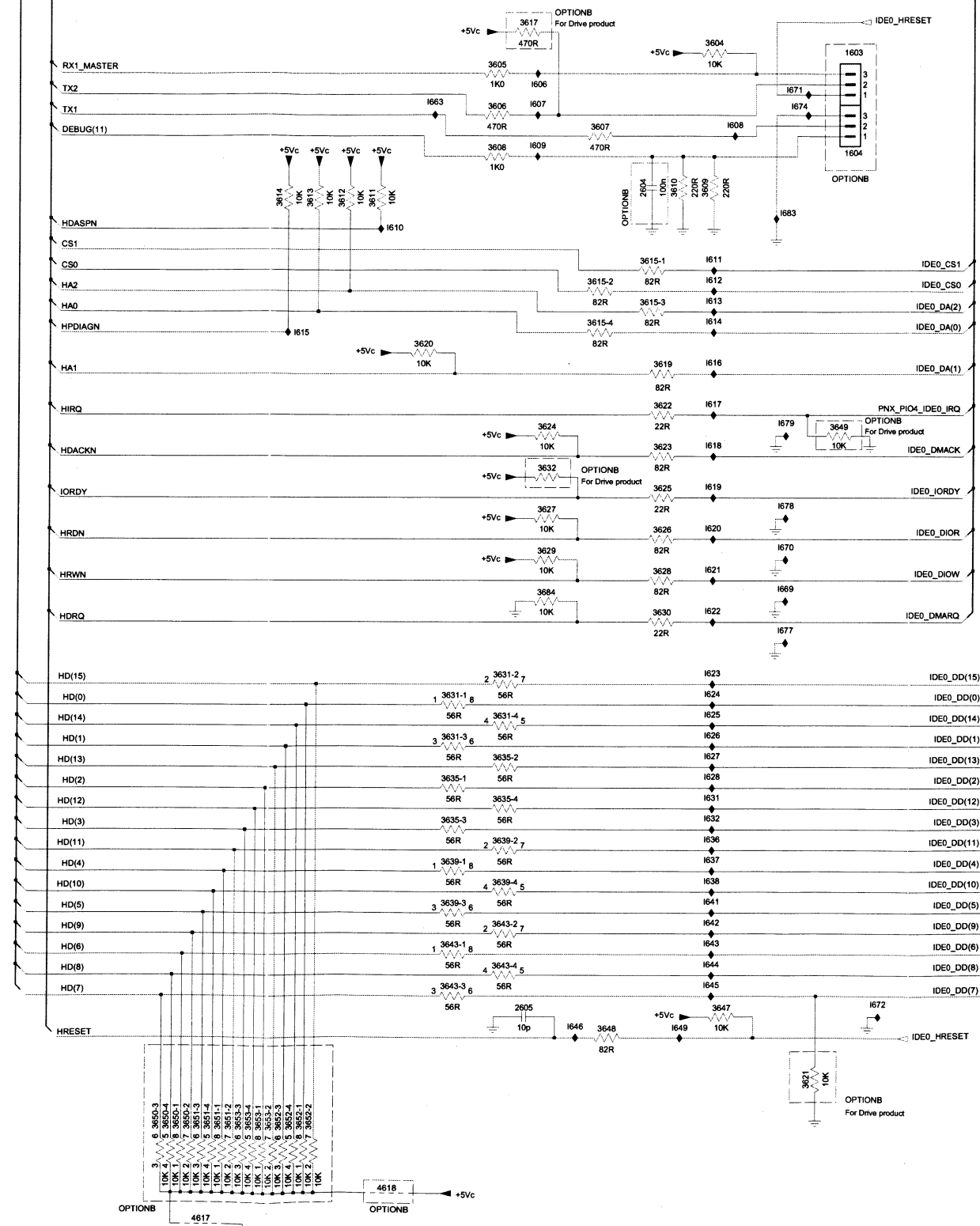
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HD(0:15)

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IDE0_DD(0:15)

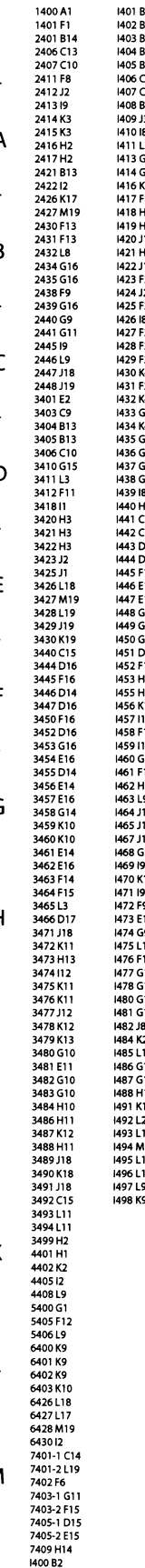


NOTE:
 OPTIONA: DENOTES COMPONENT(S) WILL BE MOUNTED BEFORE MASS PRODUCTION
 OPTIONB: DENOTES COMPONENT(S) WILL BE MOUNTED WHEN NEEDED

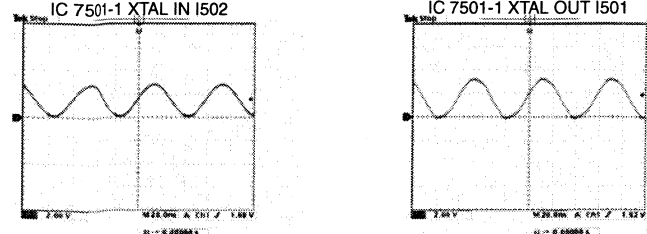
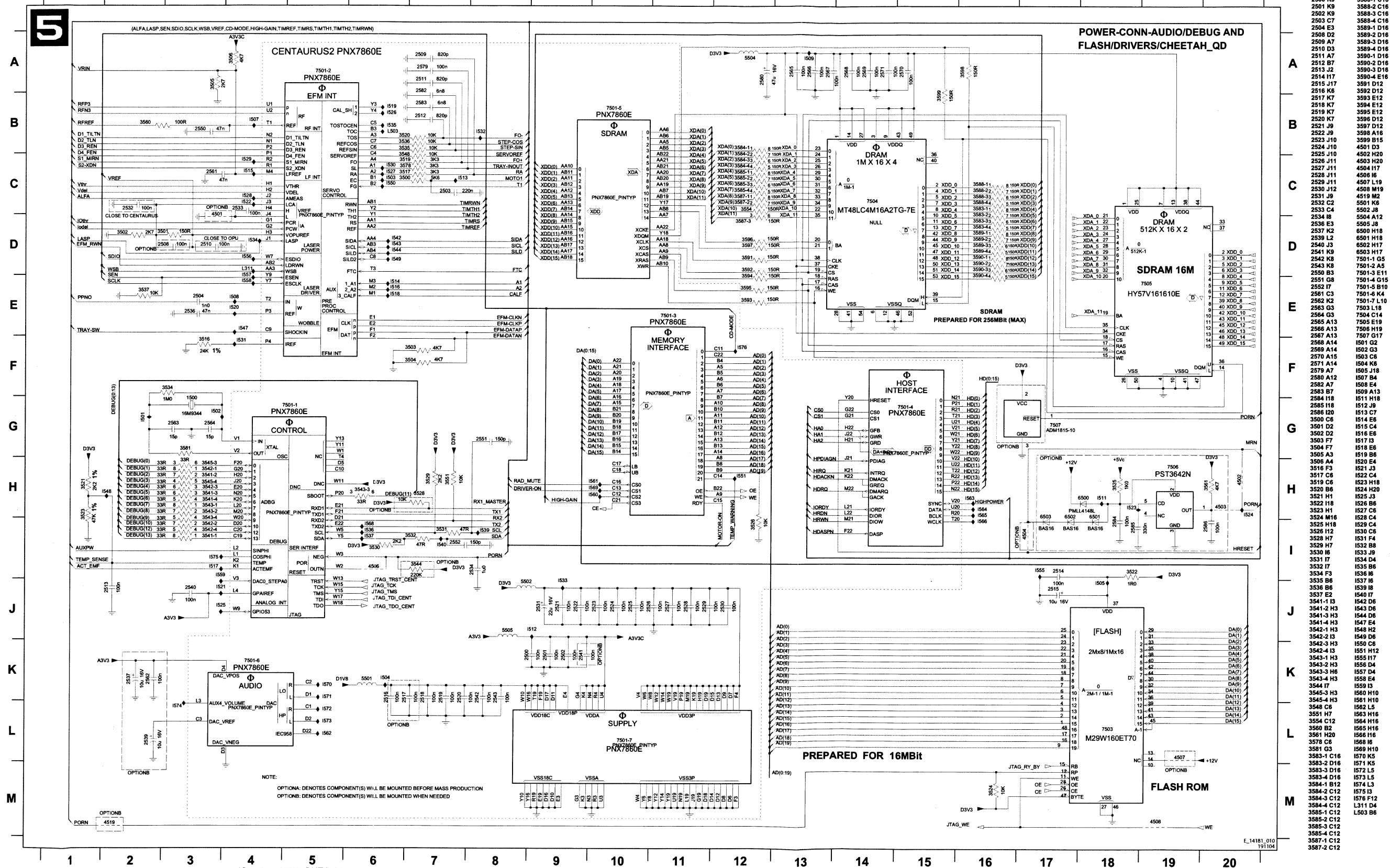
E_14181_011
191104

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16004 C14
16005 K13
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16005 B13
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16010 C14
16111 C11
16112 C11
16113 C11
16114 C10
16115-1 D14
16115-2 D14
16115-3 D14
16115-4 E14
16117 B13
16119 E14
16121 E12
16211 E15
16222 E14
16223 F14
16224 F13
16225 F14
16226 G14
16227 F13
16228 G14
16229 G13
16300 G14
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16312 H12
16313-1 H13
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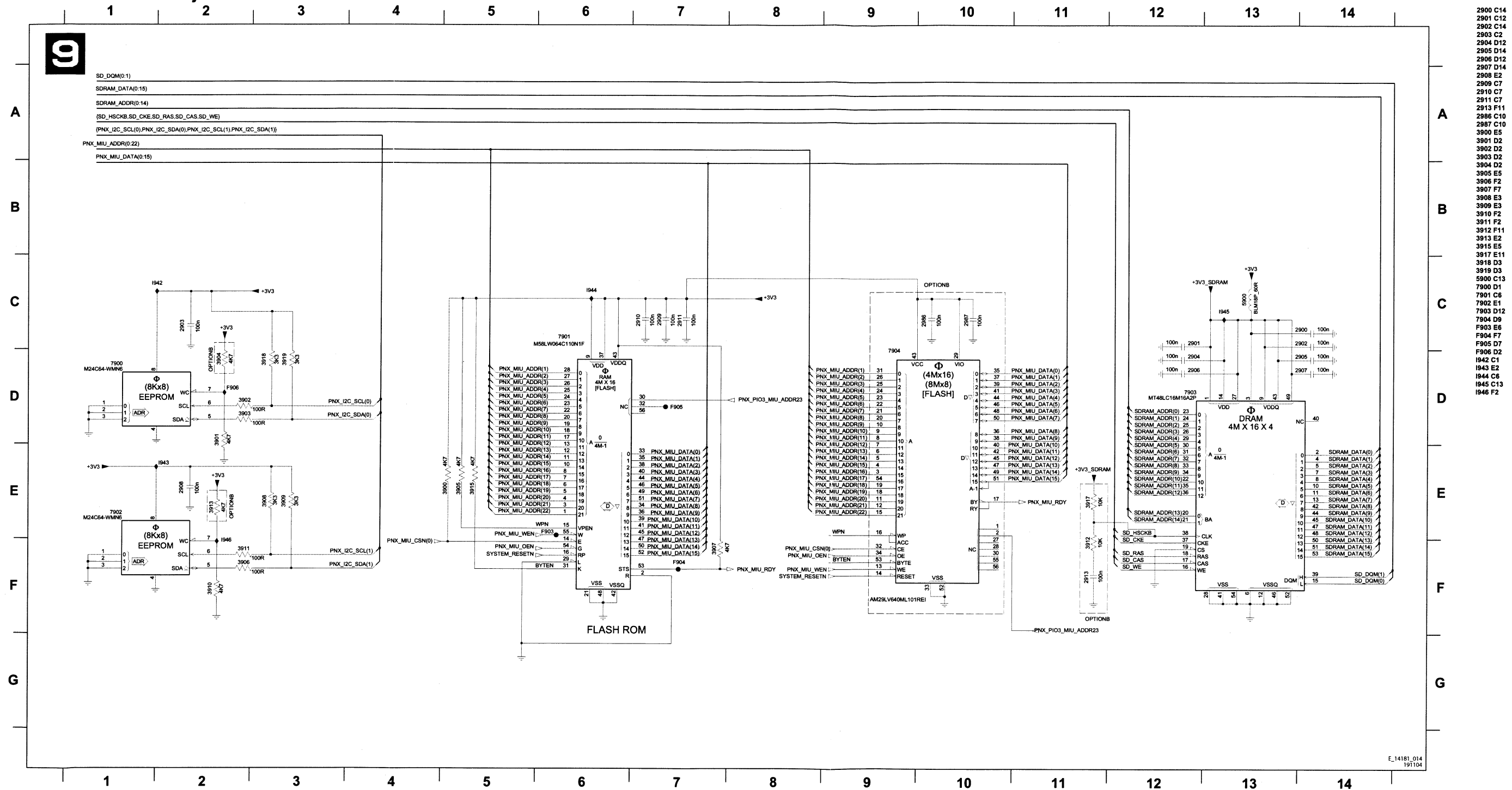
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LECO: Be Memory

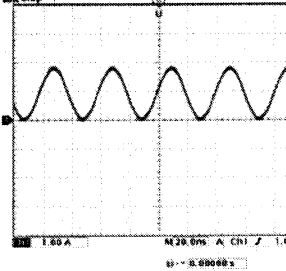


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2911 C7
2913 F11
2985 C10
2987 C10
3900 E5
3901 D2
3902 D2
3903 D2
3904 D2
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3909 E3
3910 F2
3911 F2
3912 F11
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3917 E11
3918 D3
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5900 C13
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7901 C6
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F905 D7
F906 D2
I942 C1
I943 E2
I944 C6
I945 C13
I946 F2

LECO: Be Video In

11

1002 XTAL(2078 side)



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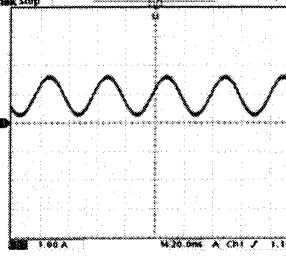
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1002 XTAL(2079 side)



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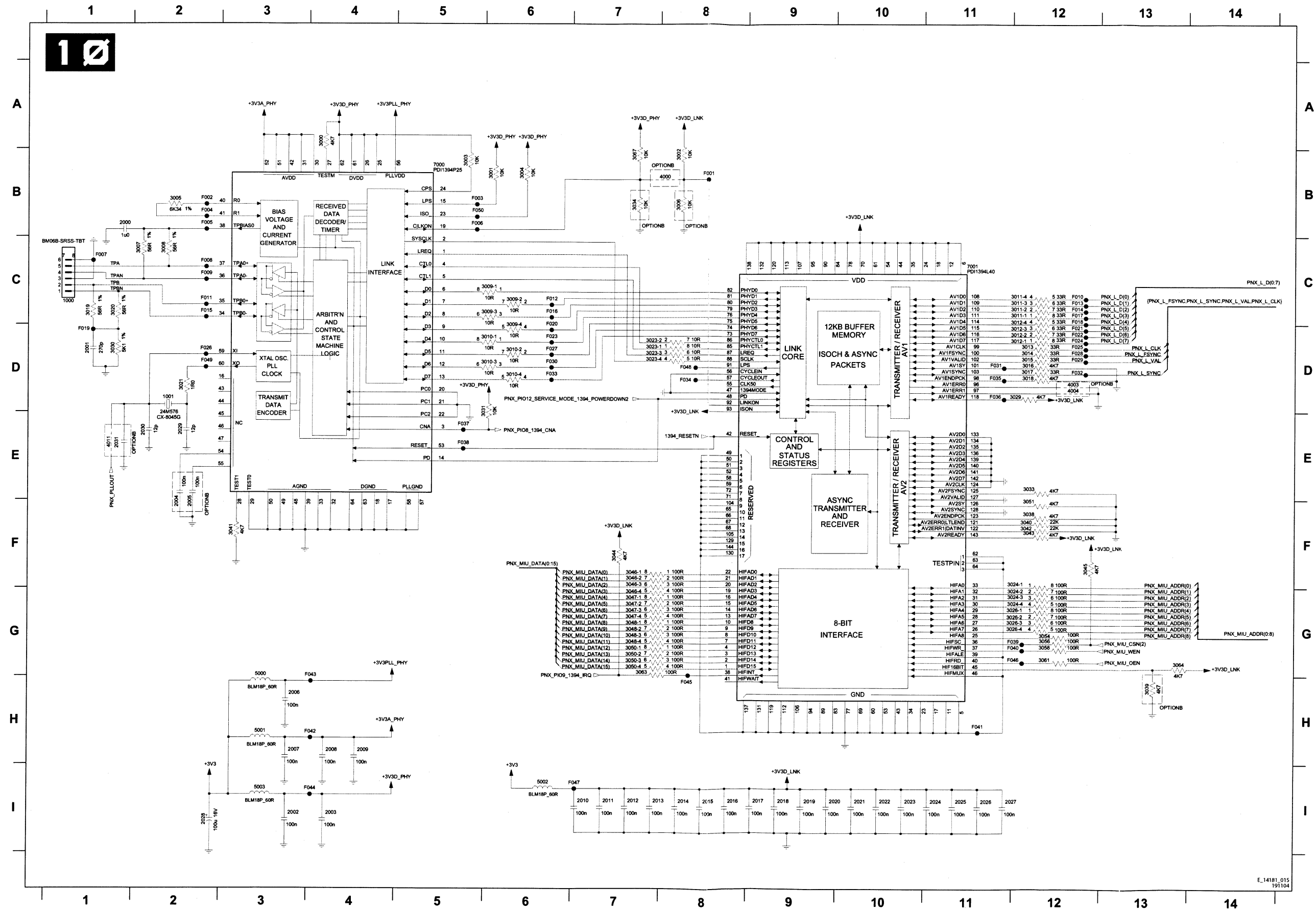
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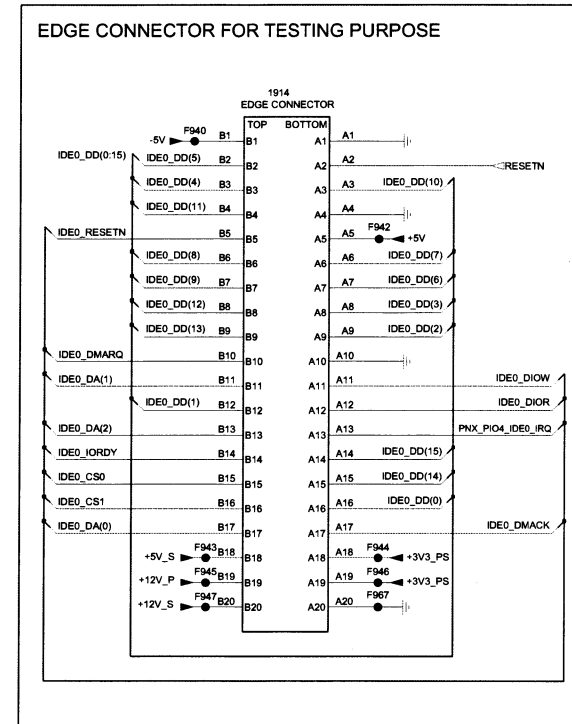
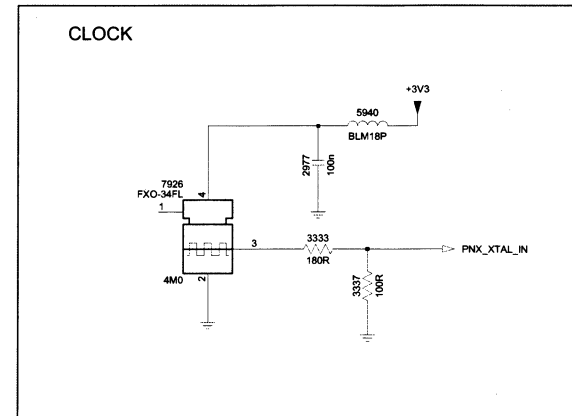
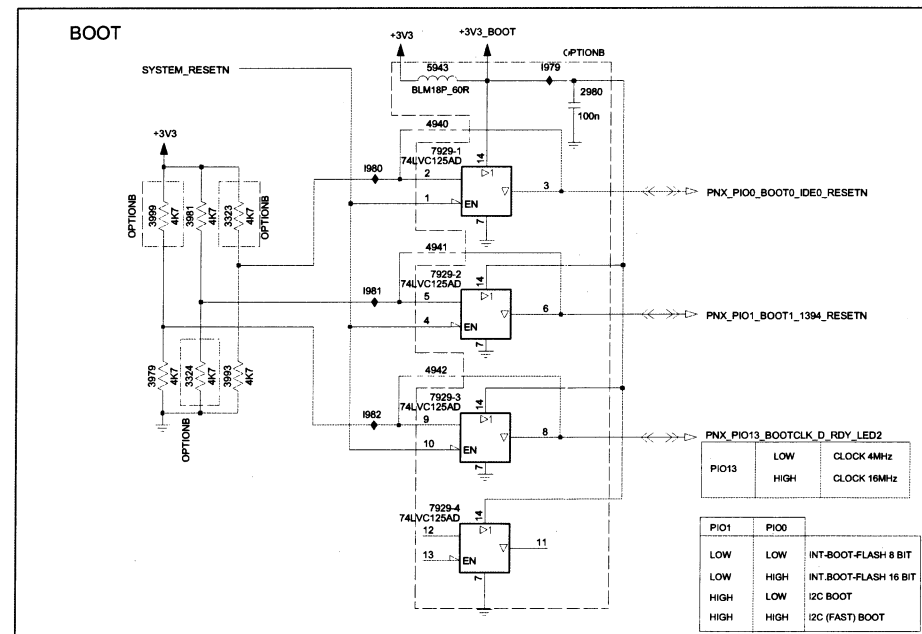
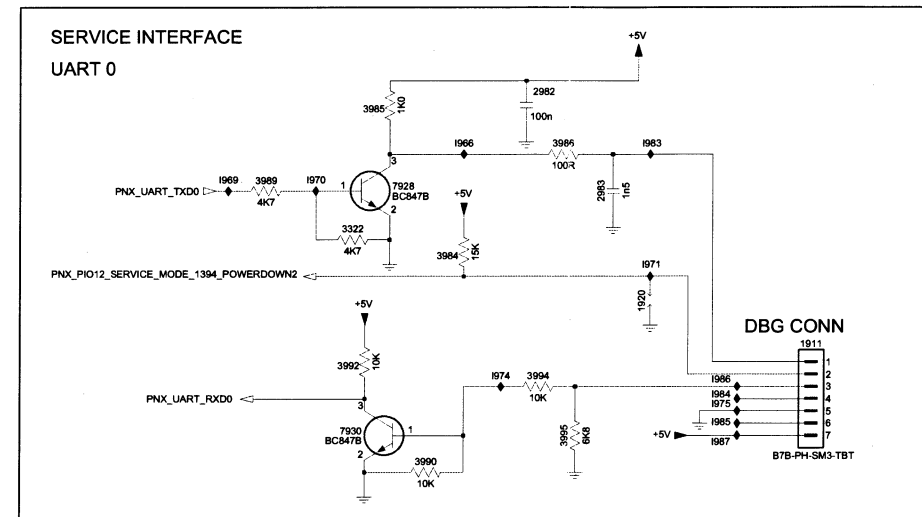
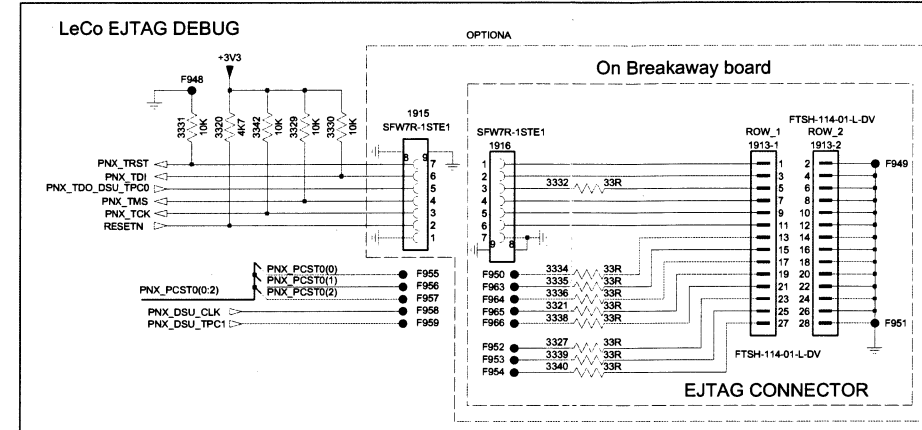
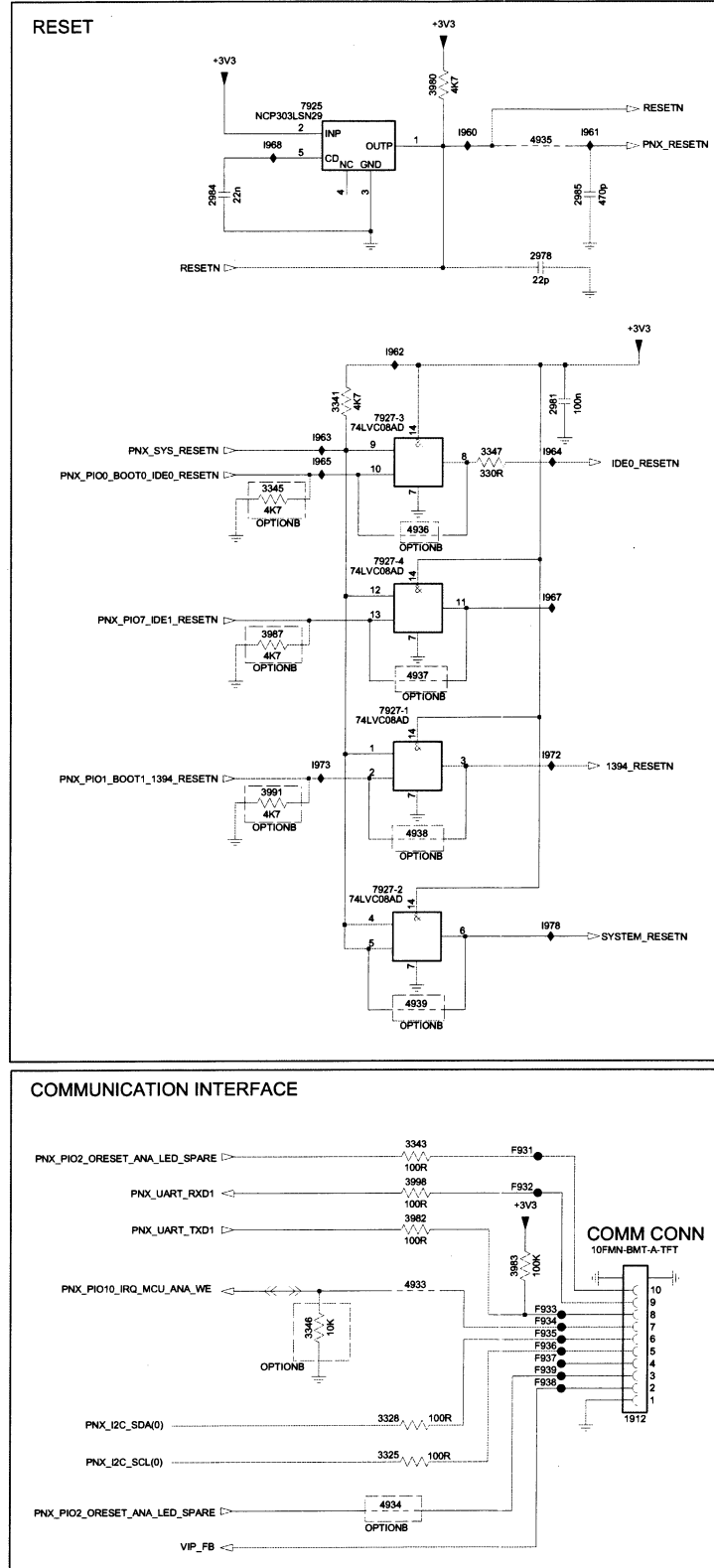
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- 2062 D4
- 1026 F8
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- 2065 D8
- 1029 F8
- 2066 E8
- 1030 C11
- 2067 F2
- 1031 F11
- 2068 F3
- 1032 F11
- 2069 F3
- 1033 F11
- 2070 F3
- 1034 F11
- 2071 F3
- 1035 F11
- 2072 F3
- 1036 F11
- 2073 F4
- 1037 F11
- 2074 F5
- 1038 F11
- 2075 G5
- 1039 F11
- 2076 G5
- 1040 E11
- 2077 G13
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- 2086 G3
- 2087 C8
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- 2089 B10
- 2090 B11
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- 2094 B12
- 2095 B8
- 2096 B8
- 2097 A8
- 2099 G4
- 3076 D8
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- 3079 E8
- 3080 F12
- 3081 F12
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- 3083-1 F12
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- 3089 F13
- 3090 C5
- 3091 F7
- 3092 F7
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- 4041 G4
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- 5011 B12
- 5012 B8
- 5013 F2
- 5014 A8
- 5015 A8
- 5016 F2
- 5018 C5
- 6001 C4
- 7007 D5
- 7008 D4
- 7009 C9
- 7010 G2
- 1001 A8
- 1002 B8
- 1003 B10
- 1004 B8
- 1005 A8
- 1006 C11
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- 1008 D4
- 1009 E7
- 1010 G11
- 1011 G11
- 1012 F4
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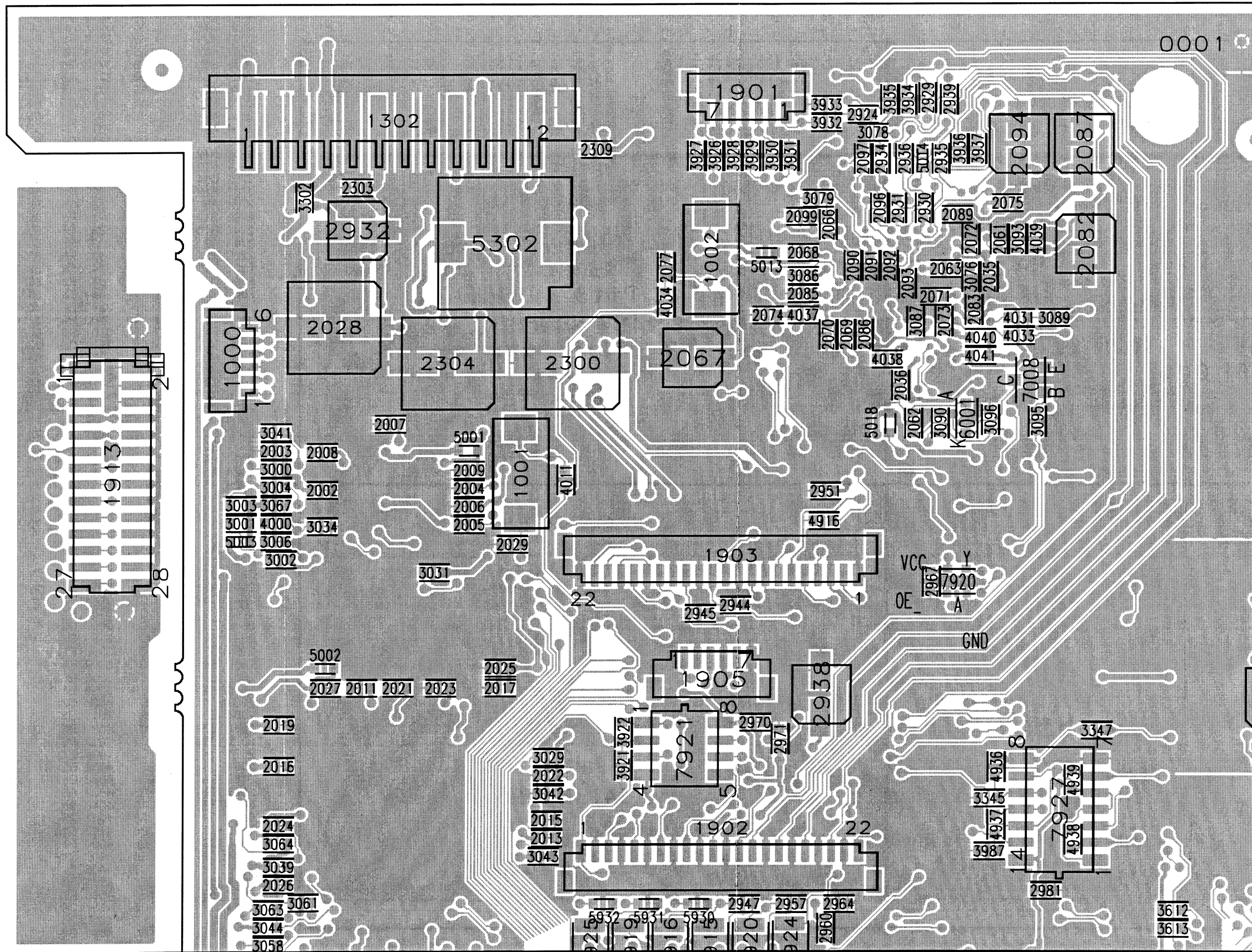
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2005 F2	5003 I3
2006 H3	7000 B5
2007 H3	7001 C11
2008 H4	F001 B8
2009 H4	F002 B2
2010 I7	F003 B5
2011 I7	F004 B2
2012 I7	F005 B2
2013 I7	F006 B5
2014 I8	F007 C1
2015 I8	F008 C2
2016 I8	F009 C2
2017 I9	F010 C12
2018 I9	F011 C2
2019 I9	F012 C6
2020 I9	F013 C12
2021 I10	F014 C12
2022 I10	F015 C2
2023 I10	F016 C6
2024 I11	F017 C12
2025 I11	F018 C12
2026 I11	F019 D1
2027 I11	F020 D8
2028 I11	F021 D12
2029 E2	F022 D12
2030 E2	F023 D6
2031 E1	F024 D12
3000 A4	F025 D12
3001 B6	F026 D2
3002 B8	F027 D6
3003 B5	F028 D12
3004 B6	F029 D12
3005 B2	F030 D8
3006 B8	F031 D11
3007 C2	F032 D12
3008 C2	F033 D6
3009-1 C6	F034 D8
3009-2 C8	F035 D11
3009-3 C6	F036 D11
3009-4 D6	F037 E5
3010-1 D6	F038 E5
3010-2 D6	F039 G12
3010-3 D6	F040 G12
3010-4 D6	F041 H11
3011-1 C12	F042 H4
3011-2 C12	F043 H4
3011-3 C12	F044 H4
3011-4 C12	F045 H8
3012-1 D12	F046 G12
3012-2 D12	F047 I7
3012-3 D12	F048 D8
3012-4 C12	F049 D2
3013 D12	F050 B5
3014 D12	
3015 D12	
3016 D12	
3017 D12	
3018 D12	
3019 C1	
3020 C1	
3021 D2	
3023-1 D7	
3023-2 D7	
3023-3 D7	
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3024-2 G12	
3024-3 G12	
3024-4 G12	
3026-1 G12	
3026-2 G12	
3026-3 G12	
3026-4 G12	
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3030 D1	
3031 D5	
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3040 F12	
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3042 F12	
3043 F12	
3044 F7	
3045 F12	
3046-1 F7	
3046-2 F7	
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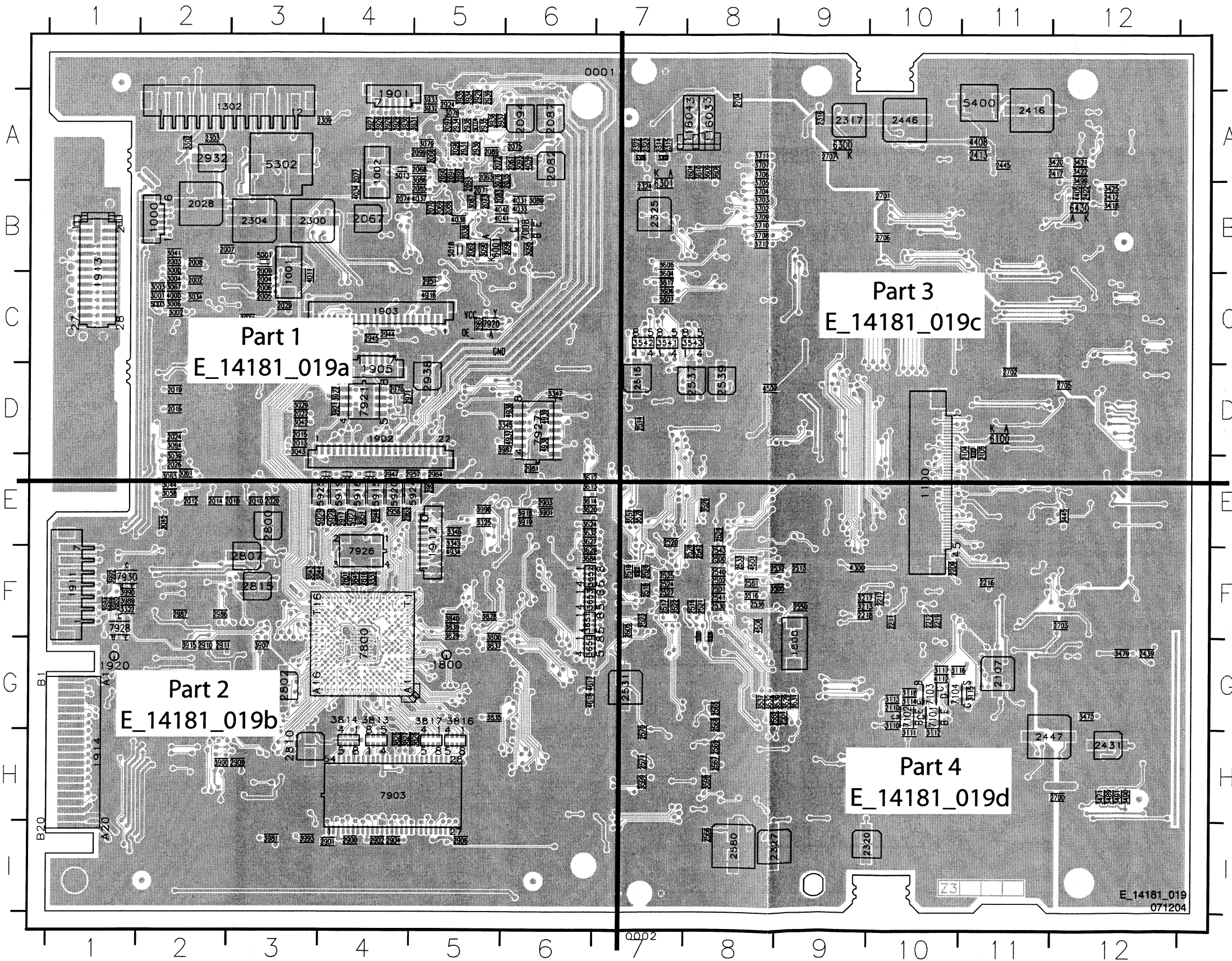
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1916 B12	I965 E4
1920 F13	I966 E12
2977 B18	I967 F6
2978 C6	I968 B4
2980 I13	I969 E10
2981 D6	I970 E10
2982 I13	I971 F13
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2984 B3	I973 G4
2985 B6	I974 G12
3320 A10	I975 G14
3321 C12	I978 H6
3322 F11	I979 I12
3323 J10	I980 J11
3324 B12	I981 K11
3325 M5	I982 I11
3327 C12	I983 E13
3328 L5	I984 G14
3329 A10	I985 G14
3330 A10	I986 G14
3331 A9	I987 H14
3332 B12	
3333 B18	
3334 C12	
3335 C12	
3336 C12	
3337 C18	
3338 C12	
3339 C12	
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3341 D4	
3342 A10	
3343 J5	
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3980 A5	
3981 J9	
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3984 F11	
3985 I11	
3986 I12	
3987 F4	
3989 E10	
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3993 K10	
3994 G12	
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4935 B6	
4936 E5	
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4939 I5	
4940 I11	
4941 I11	
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Layout: LECO Top Overview

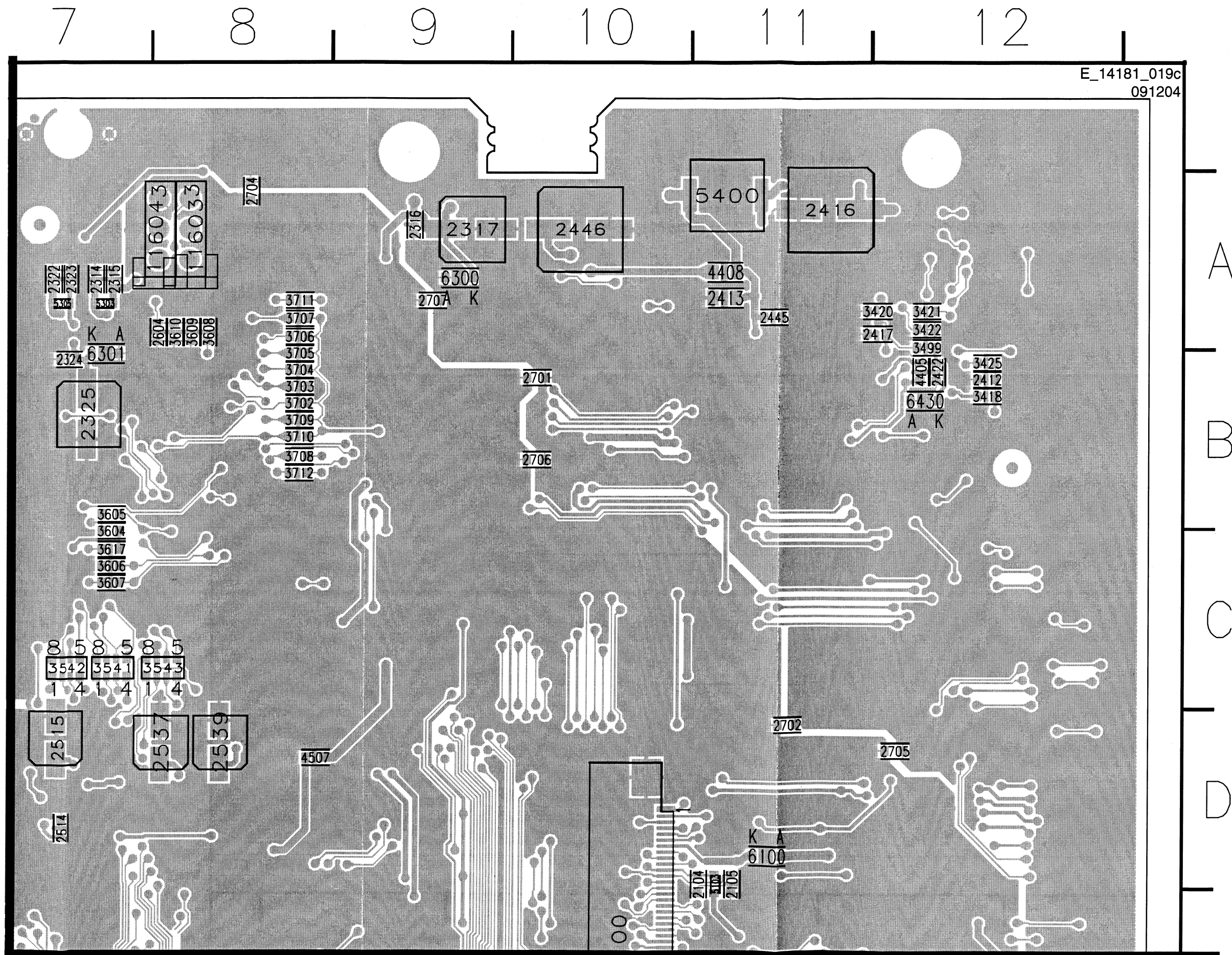
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1002 A4	1902 D4	2002 C2	2010 E3	2018 E3	2026 E2	2063 A5	2073 B5	2087 A6	2097 A5	2212 F10	2309 A4	2324 B7	2431 H12	2513 F9	2521 F8	2529 E8
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2543 F8	3061 E2	3702 B8	4939 D6
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2568 G8	3087 B5	3710 B8	5302 A3
2569 H8	3089 B6	3711 A8	5303 A7
2570 H7	3090 B5	3712 B8	5305 A7
2571 H7	3093 A6	3800 G5	5400 A11
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2605 F7	3110 G10	3816 G5	5505 F8
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2701 B10	3112 H10	3825 H4	5916 E4
2702 D11	3113 G10	3826 H5	5919 E4
2703 F12	3114 G10	3827 H4	5920 E4
2704 A8	3115 G11	3828 F5	5924 E5
2705 D12	3116 G10	3829 F5	5925 E3
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2707 A9	3118 G10	3837 G5	5928 E4
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2903 E6	3418 B12	3919 E6	7101 G10
2904 I4	3420 A12	3921 D4	7102 G10
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2909 H3	3422 A12	3926 A4	7104 G10
2910 G2	3425 B12	3927 A4	7800 G4
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2917 E4	3471 H12	3929 A4	7920 C5
2924 A5	3473 G12	3930 A4	7921 D4
2929 A5	3479 G12	3931 A4	7926 F4
2930 A5	3489 H12	3932 A5	7927 D6
2931 A5	3490 H12	3933 A5	7928 F1
2932 A2	3491 H12	3934 A5	7930 F1
2934 A5	3499 A12	3935 A5	
2935 A5	3505 F9	3936 A5	
2936 A5	3516 F8	3937 A5	
2938 D5	3526 E8	3951 E4	
2939 A5	3528 E7	3981 I3	
2944 C4	3529 G9	3984 F1	
2945 C4	3530 G9	3985 F1	
2946 E4	3531 G9	3987 D6	
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2967 C5	3599 H7	4031 B6	
2970 D4	3604 C7	4033 B6	
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3000 B2	3609 A8	4040 B5	
3001 C2	3610 A8	4041 B5	
3002 C2	3612 E6	4112 G10	
3003 C2	3613 E6	4300 F9	
3004 C2	3614 E6	4405 B12	
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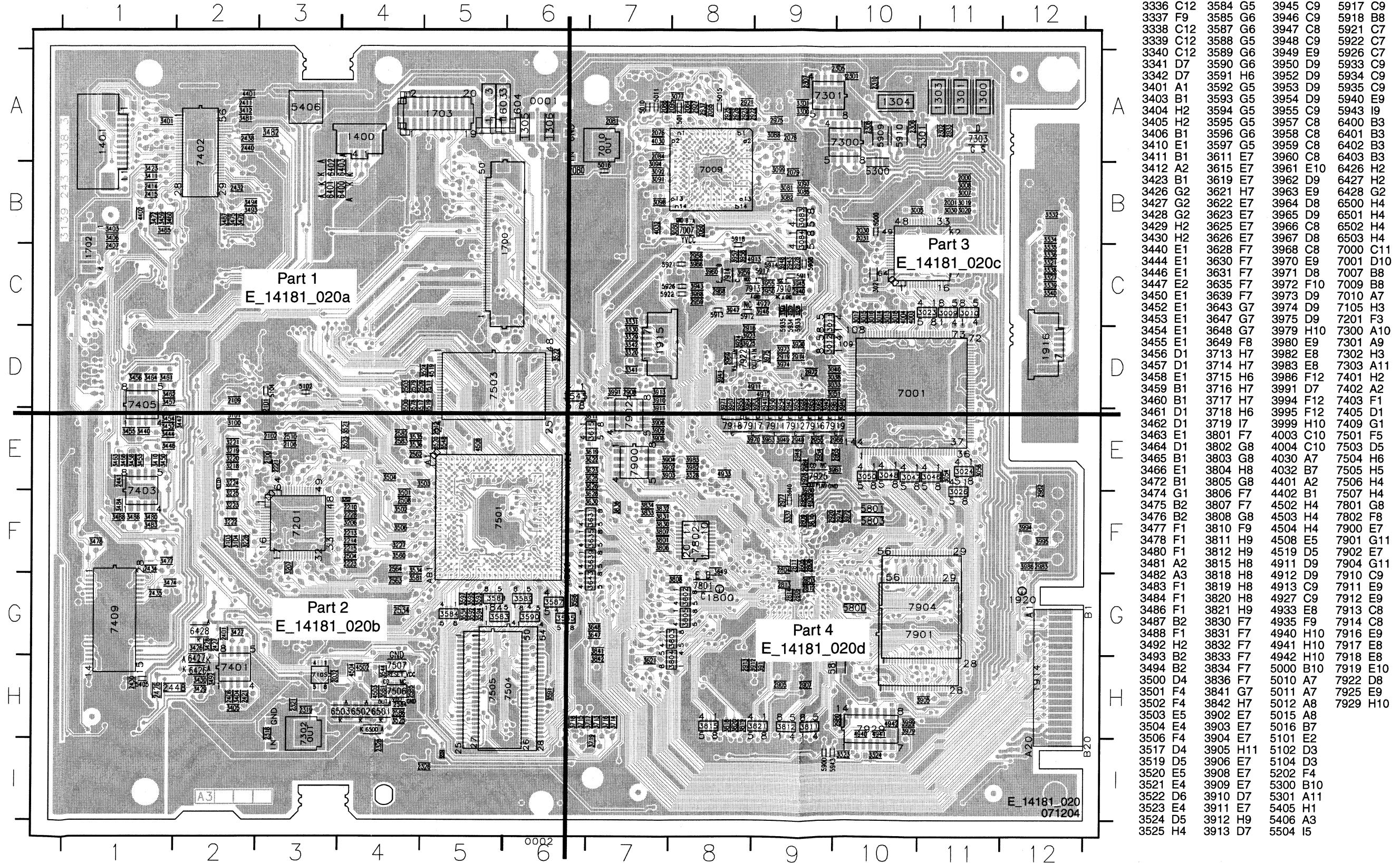
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Layout: LECO Top View Part 3

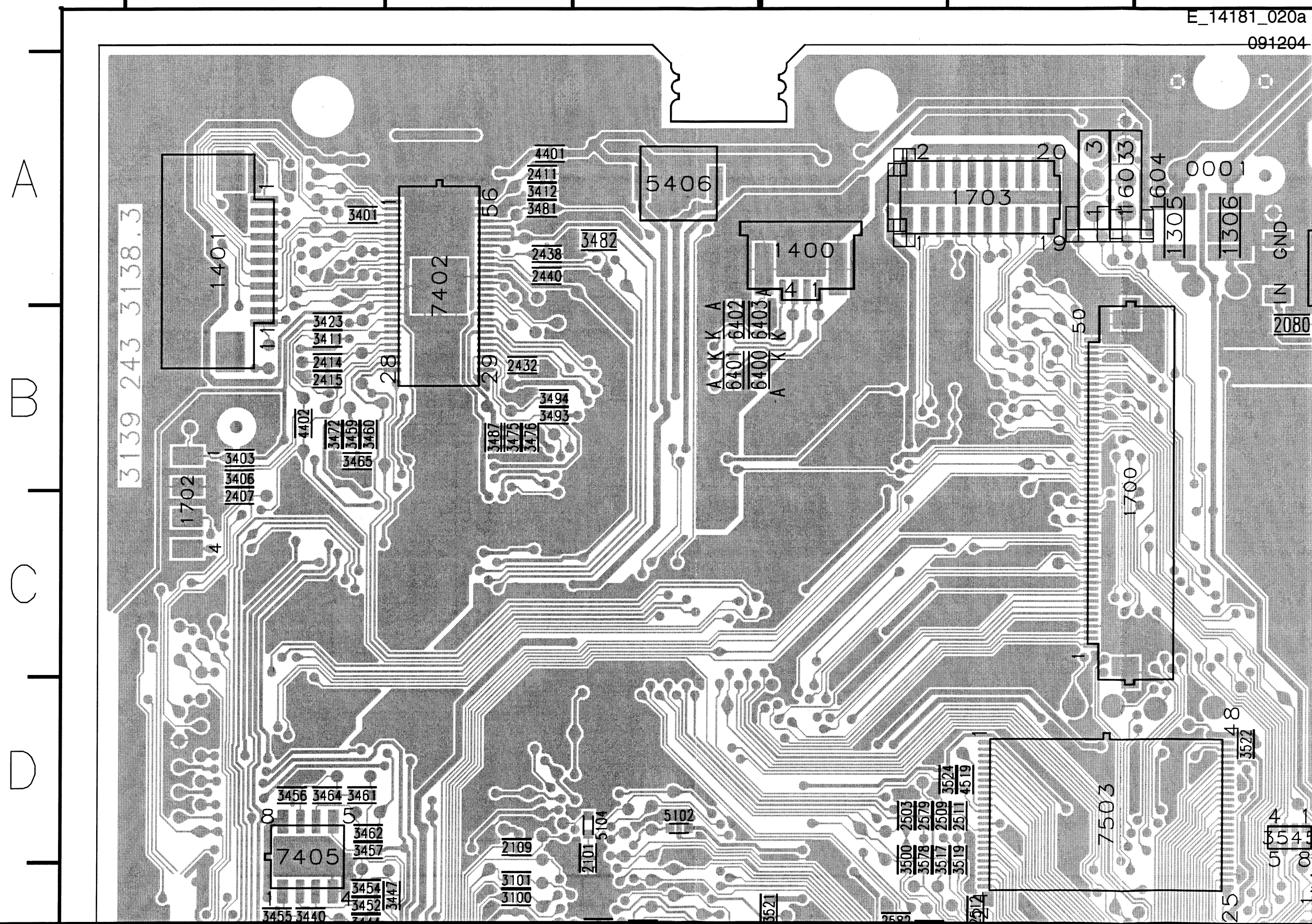


Layout: LECO Bottom View

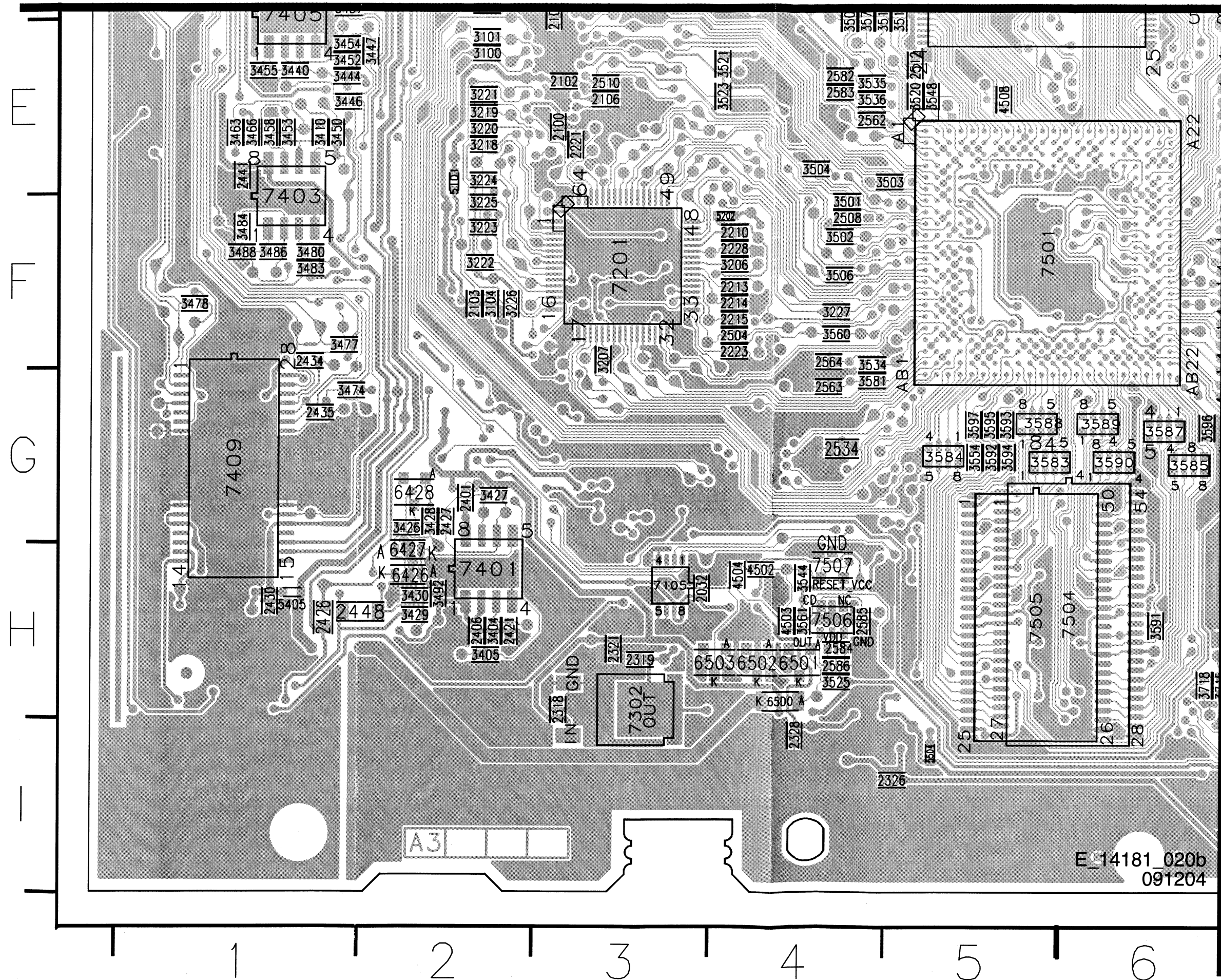
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1301 A11	2000 B11	2081 A7	2214 F4	2318 H3	2426 H1	2508 F4	2584 H4	2814 G9	2925 A8	2950 C9	2972 D9	3008 B11	3020 B11	3050 E10	3091 B7	3219 E2	3321 C12	3535 E4	3920 D9	5801 F10
1303 A11	2001 B11	2084 A7	2215 F4	2319 H3	2427 G2	2509 D4	2585 H4	2905 H9	2926 A8	2952 D9	2974 F10	3009 C11	3021 C10	3051 D9	3092 B7	3220 E2	3323 I10	3536 E4	3923 D8	5802 H9
1304 A10	2030 B10	2088 A7	2221 E3	2321 H3	2430 H1	2510 E3	2586 H4	2907 H9	2927 A8	2953 D8	2975 A9	3010 C11	3023 C11	3054 E11	3094 B7	3221 E2	3324 I10	3544 H4	3924 D8	5803 F10
1305 A6	2031 B10	2095 A7	2223 F4	2326 I5	2432 B2	2511 D5	2803 G9	2908 D7	2928 C9	2954 E9	2977 F9	3011 C9	3024 E11	3056 E11	3097 B9	3222 F2	3327 C12	3545 D6	3925 D8	5900 I9
1306 A6	2032 H3	2100 E3	2228 F4	2328 I4	2434 F1	2512 E5	2804 F9	2913 H8	2933 A11	2955 E9	2978 E9	3012 D9	3026 F11	3077 A8	3098 B7	3223 F2	3328 E8	3548 E5	3938 C9	5908 C9
1400 A4	2060 B8	2101 D3	2301 A10	2401 G2	2435 G1	2534 G4	2805 F9	2914 D9	2937 A8	2958 C8	2980 H10	3013 C10	3030 B11	3080 B8	3099 B9	3224 E2	3329 D7	3554 G5	3939 C9	5909 A10
1401 A1	2064 A8	2102 E3	2302 A11	2406 H2	2438 A2	2562 E4	2806 G9	2916 D8	2940 C9	2959 C8	2982 F12	3014 C10	3033 D9	3081 B9	3100 E2	3225 F2	3330 D7	3560 F4	3940 D10	5910 A10
1700 C5	2065 A8	2103 F2	2305 A10	2407 C1	2440 A2	2563 G4	2808 F9	2919 D9	2941 D9	2961 D9	2983 F12	3015 C10	3038 D9	3082 B9	3101 E2	3226 F2	3331 C7	3561 H4	3941 D8	5911 C9
1702 C1	2076 A7	2106 E3	2306 A10	2411 A2	2441 E1	2564 F4	2809 F9	2920 F9	2942 D9	2965 E10	2984 E9	3016 C10	3040 D9	3083 B9	3104 F2	3227 F4	3332 B12	3578 D4	3942 D9	5912 C8
1703 A5	2078 A9	2109 D2	2307 A9	2414 B1	2448 H2	2579 D4	2811 F9	2921 A8	2943 C9	2966 E10	2985 F9	3017 C10	3046 E11	3084 B9	3206 F4	3300 A9	3334 B12	3581 G4	3943 C8	5913 C8
1915 D7	2079 B9	2210 F4	2308 A10	2415 B1	2503 D4	2582 E4	2812 G9	2922 A8	2948 E9	2968 C8	3005 B10	3018 C10	3047 E10	3085 B9	3207 F3	3301 A9	3335 C12	3583 G5	3944 C9	5914 C9



1 2 3 4 5 6



Layout: LECO Bottom View Part 2



7 8 9 10 11 12

E_14181_020d
071204

8. Alignments

8.1 Reprogramming Procedure of NVM on the FEBE board

The NVM, item 7905 (7900 for LECO), on the FEBE board contains the slash information of the set
The slash version is stored at the end of the production line of the set.

In case of failure, the NVM must be replaced by an empty device. By way of commands via the Diagnostic Software or via ComPair, the factory settings must be restored in the NVM.

8.1.1 Slash Version

The slash version is stored with command 1217 followed by the slash version as parameter.

The slash versions used in DVDR610, DVDR615 and DVDR616 are the following:

- DVDR610/00/02/19/33: 11001
- DVDR610/05: 11002
- DVDR615/00/02/19/33: 11003
- DVDR615/05: 11004
- DVDR616/00/02/19/33: 11003
- DVDR616/05: 11004

Example:

DD:>1217 11003

8.2 Rework Procedure IEEE Unique Number

8.2.1 Scope:

The procedure describes how to upgrade sets with a unique number after repair. This unique number is stored in the NVRAM (item 7001 [7900 for LECO]) of the FEBE board at the end of the production line.

This procedure is only valid or necessary when:

- The FEBE board is replaced
- NVRAM on the FEBE board is replaced
- NVRAM is cleared

In all other cases the repaired set retains its unique number.
The procedure defines several means to re-assure the unique number depending on the possibilities of repair or the state the faulty set is in.

8.2.2 Handling:

State of original (defective) board:

1. The FEBE board starts up in Diagnostics Mode: follow procedure A to retrieve the valid unique number
2. The FEBE board does NOT start up in Diagnostics Mode: follow procedure B.

8.2.3 Procedure A

1. Connect defective digital board to PC via serial cable (3122 785 90017)
2. start up hyper terminal or any other serial terminal via the correct settings (DSW command mode interface)
3. read out existing unique number via 1208
example:
DS:> 1208 120800: DvldNumber is: 0x0C22384E5A
Test OK @
4. note read out
5. program new digital board via nucleus 1207
example:
DS:> 1207 1234567890 120700: Test OK @

The set has now the original unique number

8.2.4 Procedure B

1. Note the serial number of the set example:
VN050136130156
– VN = production centre (VN....Szekesfehervar).
According to UAW-500: V=22 and N=14
– 05 = change code (this is not used for this calculation)
– 01 = YEAR
– 36 = Production WEEK
– 130156 = Lot and SERIAL number
2. Calculate the unique number: this number always exists out of 10 hexadecimal numbers.
3. First 5 numbers: First we calculate a decimal number according to the formula below: $35828 * \text{YEAR} + 676 * \text{WEEK} + 26 * A + H + 8788$ The figures are fixed, YEAR + WEEK + factory code (A + H) are variable Example: $35828 * 01 + 676 * 36 + 26 * 1 + 8 + 8788 = 68986$ (decimal) Then we translate the decimal number to a hexadecimal number. example: 68986 (decimal) = 10D7A (hex)
4. Last 5 numbers: The last 5 numbers exist out of the Lot and SERIAL number.
We have to translate the decimal number to the next 5 hexadecimal numbers: Example: 130156 (decimal) = 1FC6C (hex)
5. Program new digital board via nucleus 1207. Therefore we use the 10 hexadecimal numbers we calculated above:
example:
DS:>1207 10D7A1FC6C
120700: Test OK @

The set has now its original unique number

8.3 Alignments after replacing the Boot EEPROM 7904 (7900 for LECO) on the FEBE Board

The NVM, item 7904 (7900 for LECO), on the FEBE Board contains the "Diversity String" that tells the software during startup which hardware version is present.

The setting is stored in the NVM during the production of the FEBE Board.

In case of a fault the NVM must be replaced by a programmed device containing the boot script.

Via the Diagnostic Software the Diversity String is stored with command 1226, followed by the Diversity String as parameter.

The diversity strings used in DVDR610, DVDR615 and DVDR616 are the following:"

FEBE Board Type:	String
E1_AV3_4	444248495AB8200145315F4156335F3435040300000101020001000020040000
E2_AV3_4	444248496CB8200145325F4156335F343604030000000020001000020040000
OL22FEBE	4442484960A440016F6C323266656265931105000000002000100002004000044564452323030312E303031010300080001000000002010000000000000000

Example:

DS:> 1226 444248495AB8200145315F4156335F3435040300000101020001000020040000122600
Test OK @

E1_AV3_4 FEBE Board (for DVDR615/00/02/05/19/33 and DVDR616/00/02/05).

E2_AV3_4 FEBE Board (for DVDR610/00/02/05/19/33).

With command 1228 the settings can be displayed.

9. Circuit-, IC descriptions and list of abbreviations

9.1 MOBO (Analog) Board

9.1.1 General

The pcba consists of the following parts:

- Control unit Slave μ P
- Power supply unit
- Frontend (Audio & Video)
- Input/Output switching
- Audio ADC & DAC processing
- Analog Follow-Me circuit
- IR Blaster (for EPG sets only)

9.1.2 Control unit Slave μ P

The core element of the MOBO analog board is the slave μ P TMP87CM74AF [7107].

It runs on a 5V supply and is responsible for the following functions:

- Interface with the Chrysalis chip on the FEBE Digital backend
- Evaluation of the keyboard matrix
- Decoding the remote control commands from the infra-red receiver
- Activation and control of the display
- Heater voltage generation
- Fan control
- IR Blaster (for EPG sets only)

It runs on a high clock frequency of 8MHz with resonator [1101] and a low clock frequency of 32.768kHz with resonator [1102].

9.1.3 Interface to the Chrysalis chip

The communication to the Chrysalis chip on the FEBE Digital backend is done via I²C interface, where the TMP87CM74AF acts in slave-mode.

9.1.4 Evaluation of the keyboard matrix

A resistor network on the Keyboard is used to generate a specific direct voltage value (KEY1- & KEY2-line), depending on the pressed key. Via the resistors 3157 and 3159 on the analog/digital (A/D) ports, [7107] pin 32 and 32 the evaluation is done.

9.1.5 IR receiver and signal evaluation

The IR receiver [7200] on the Keyboard contains a selectively controlled amplifier as well as a photo-diode. The photo-diode changes the received infra red transmission to electrical pulses, which are then amplified and demodulated. On the output of the IR receiver [7200], a pulse sequence with TTL-level, which corresponds to the envelope curve of the received IF remote control command, can be measured. This pulse sequence is fed into the controller for further processing via pin 22 [7107].

9.1.6 Vacuum Fluorescence Display

The VFD BJ900GNK [1100] is fully controlled by the microcontroller. The microcontroller also includes the driving stages. Only two additional drivers [7110] and [7112] are necessary for the grids 8 and 9 because of their large size.

9.1.7 VFD Heater Voltage Generator

The circuit around [7102], [7103] and [7104] is used to generate a proper AC-voltage for the filament of the VFD. For

this the microcontroller generates an appropriate rectangular signal with 50% duty-cycle and a frequency of 30kHz at pin 19. [5101] and [2112] are acting as resonance circuit. Via zener-diode [6102] and resistors [3111], [3113] and [3116] the two heater pins of the VFD (FIL1 and FIL2) are clamped so that the grids and segments can be fully switched off.

9.1.8 Fan Control

To avoid unwanted temperatures inside the set (especially the Laser on the OPU of the drive is very sensitive) a fan is located at the rear of the FEBE module. The speed control is dependent on the ambient temperature. A NTC resistor [3211] located on the Keyboard measures the temperature. The change in temperature is translated into dc levels and send to pin 28 of slave μ P [7107]. High / low signals is then sends out via pin 5 and 6 of slave μ P [7107] to control transistors [7106] and [7108] which regulates the fan motor to 3 different speeds

9.1.9 Power Supply Unit

Functional principle:

This power supply works in the way of a flyback converter. In the mains input part [1931 to 2315], the mains voltage is rectified and buffered in the capacitor [2315]. From this direct voltage at [2315] energy is transferred into the transformer [5300, pins 7-5] during the conductive phase of the switching transistor [7307] and is stored there as magnetic energy. This energy is passed to the secondary outputs of the power supply in the blocking phase of the switching transistor [7307]. With the switch-on time of the switching transistor [7307], the energy transferred in every cycle is regulated in such a way that the output voltages remain constant regardless of changes in the load or mains voltage. The power transistor is driven by the integrated circuit [7311].

Mains input part:

The mains input part extends from the mains socket [1931] to the capacitor [2315]. The diodes [6302, 6303, 6305 and 6307] rectify the AC supply voltage, which is then buffered by the capacitor [2315]. The common mode coil [5302] and capacitor [2311] work as a filter to block interference arising in the power supply from the mains. Components [1302], [3316] protect the power supply against short-term over voltages in the mains, e.g. caused by indirect lightning.

Start-up with Mains-on:

After connecting the power cord to the mains, the capacitor [2331] is loaded via a current source between pin 8 and pin 1 in the IC [7311]. Once the voltage on [2331] and therefore the supply voltage V_{CC} of the IC [7311] has reached approx. 11V, the IC starts up and provides pulses at its output pin 5. These pulses are used to drive the gate of the power transistor [7307]. The frequency of these pulses is depending on load and mains voltage. The current consumption of the IC is approx. 5 mA at V_{CC} in normal mode.

If V_{CC} drops to below approx. 9V (e.g. with power limitation) or if V_{CC} exceeds approximately 16V (e.g. interruption of the control loop), the output of the IC [7311, pin 5] is blocked and a new start-up cycle begins.

(See also Overload, Power Limitation and Burst Mode section)

Normal operation:

With the power supply in normal mode, the periodic sequences in the circuit are divided primarily into the conductive and blocking phase of the switching transistor [7307]. During the **conductive phase** of the switching transistor [7307], current flows from the rectified mains voltage at capacitor [2315] through the primary coil of the transformer [5300, pins 7-5], the transistor [7307] and resistors [3330, 3331] to ground. The

positive voltage on pin 7 of the transformer [5300] can be assumed as constant for a switching cycle. The current in the primary coil of the transformer [5300] increases linearly. A magnetic field representing a certain value of the primary current is formed inside the transformer. In this phase, the voltages on the secondary coils are polarized such that the diodes [6300, 6301, 6304, 6306, 6309, 6311, 6315 and 6318] block. From the controller [7319] a current is supplied into the CTRL input on the IC [pin 3, 7311] via optocoupler [7316]. Once the switch on time of the switching transistor [7307] - that corresponds to the current supplied into the CTRL input - has been reached, the switching transistor [7307] is switched off. When the switching transistor has been switched off, the **blocking phase** begins. No more energy will be transferred into the transformer. The inductivity of the transformer will still attempt to keep the current flowing at a constant level ($U=L \cdot di/dt$). Switching off transistor [7307] interrupts the primary current circuit. The polarity of the voltages on the transformer is reversed, which means that the diodes [6300, 6301, 6304, 6306, 6309, 6311, 6315 and 6318] become conductive and current flows into the capacitors [2302, 2309, 2316, 2321, 2324 and 2328] and the load. This current is also ramp-shaped (di/dt negative, therefore decreasing).

The **feedback control** for the switched-mode power supply is done by changing the conductive phase of the switching transistor so that either more or less energy is transferred from the rectified mains voltage at [2315] into the transformer. The regulation information is provided by voltage reference [7319]. This element compares the 5V-output voltage via voltage divider [3359, 3362, 3363] with an internal 2.5V reference voltage. The output voltage of [7319] passes via an optocoupler [7316] for insulation of primary and secondary parts as a current value into pin 3 on the IC [7311]. The switch-on time of the transistor [7307] is inversely proportional to the value of this current.

Overload, power limitation, burst mode:

With increasing load on one or more of the power supply outputs, the switch-on time for the power transistor [7307] increases, and thus also the peak value of the delta-shaped current through this power transistor. The equivalent voltage of this current profile is passed from resistors [3330] and [3331] via [3334] to pin 5 of the IC [7311]. If the voltage on pin 2 reaches approx. 0.4V in one switching cycle, the conductive phase of the switching transistor is ended immediately. The check is done in each individual switching cycle. This process ensures that no more than approx. 50W can be taken out from the mains (= **power limitation**).

If the power supply reaches the power limit, the output voltages and the supply voltage V_{CC} on pin 1 of the IC [7311] will be reduced following further loading. If V_{CC} is less than approx. 9V at any point during this process, the output of the IC [7311, pin 6] is blocked. All output voltages and V_{CC} decrease and a new start-up cycle begins. If the overload status or short-circuit remains, the power limitation will be activated immediately and the voltages will again decrease, followed by another start-up cycle (**Burst Mode**). The amount of power taken up from the mains in burst mode is low.

Standby modes:

In the AV-Standby operating mode of the set, the DD_ON control line is low switching off the +5VE and +12VE supply [connector 1932] to the FEBE Frontend and DVD drive. This reduces the amount of power taken from the mains.

In Low Power Standby mode, additional STBY control line is high switching off the 12V, 5V, 5N and 3V3SW supply. In this mode all functions are switch off and the slave μP (in idle mode) and real time clock (32.768kHz) is running. This reduces power consumption to less than 3W. In some program mode the slave μP provides a wakeup service (STBY-line switches to low), then the Chrysalis main controller starts up and asks for the wakeup reason.

9.1.10 Tuner Frontend

This unit support Broadcast System PAL: BG, DK, I and SECAM: L, L'.

It has a RF IN for antenna connection and RF OUT which provides a RF loop through during Standby mode for connection to the TV.

The frontend is controlled by the I²C (SCL_5V- and SDA_5V-) lines coming from the slave μP .

Complete video processing is done in this unit and the video output (CVBS) is out from pin 17 via transistor 7000 as VFV-line to the Video I/O and Follow Me circuitry.

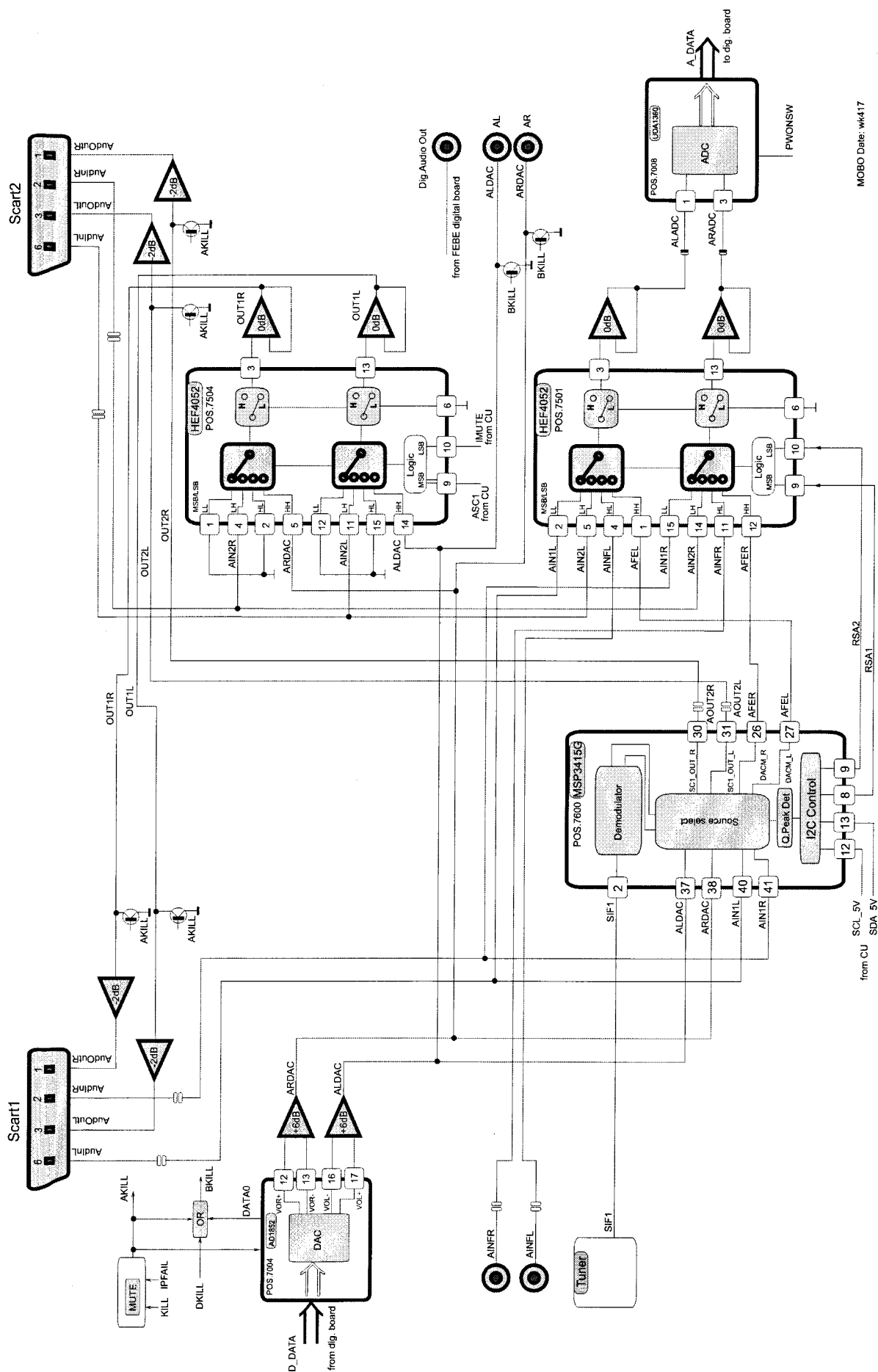
The audio-IF component SIF1 is taken out from pin 7 for demodulation in the sound processor [7600].

Audio demodulator

The sound demodulation is done by the MSP3415 [7600], which is also fully controlled via I²C-bus by the slave μP (determination of bandwidth, amplitude, standard, ...). The audio signals are available at pin 26 and pin 27 of [7600] and fed as AFER- & AFEL-line to the audio-I/O for further processing.

9.1.11 Audio routing

Audio IO Europe Overview



MOBO Date: wk417

Figure 9-1 MOBO Audio IO Eur

The processing of audio is always done in stereo (e.g. separate left- and right-channel) and the complete switching is realized by using HEF4052, which is a dual four-to-one multiplexer and MSP3415G, multi-sound processor. In principle there are three independent selectors:

a) Scart 1-Output-Path:

Pos [7504] is used to select either Scart 2-Input (AIN2L/AIN2R) or the signal directly from the audio DAC [7004] (ALDAC/ARDAC) as the output source for Scart 1 (AOUT1L/AOUT1R). The control is done by means of the lines ASC1S coming from slave μ P [7107].

b) Scart 2-Output-Path:

The MSP [7600] is used to select either Scart 1-Input (AIN1L/AIN1R), signals from the DAC [7004] (ALDAC/ARDAC) or Tuner frontend as the output source for Scart 2 (AOUT2L/AOUT2R).

c) Record-Path:

Pos [7501] selects either signals from Scart 1 (AIN1L/AIN1R) or Scart 2 (AIN2L/AIN2R) or Cinch-Front (AINFL/AINFR) or the MSP [7600] (AFEL/AFER) and routes to the audio ADC [7008] (ALADC/ARADC) for record purposes. The switch is controlled via RSA1 and RSA2 signals. These signals come from the MSP [7600], which acts as a port expander of the slave μ P. The two selectors [7501] & [7504] has a separate Op-Amp on the output for level-adaptation-, performance- and line-driving-reasons: [7500-1 & -2] for record, [7503-1 & -2] for Scart 1-Output respectively. Every audio output line on the two Scart connectors and rear Cinch sockets can be killed (muted) by the AKILL-line [7505], [7507], [7602] & [7603] and the BKILL-line [7802], [7804].

Additionally to analog audio the set is also equipped with a digital output via cinch plug [1955]. The signal is generated on the FEBE Digital backend and routed via audio interface cable and connector [1900] to the MOBO analog board. Here the DAOUT-line first passes a 6-fold inverter [7551] being used as a driver and for performance reasons (noise reduction, jitter, ...). Afterwards a transformer [5551] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3559 & 3563] to cinch plug [1955]. The capacitor [2553] performs an AC-coupling between connector- and set-ground.

9.1.12 Audio ADC/DAC

The conversion of analog audio signals from the record-selector [7501] in the audio I/O (ALADC & ARADC) is done via UDA1361TS [7008]. This IC can process input signals up to $2V_{rms}$ by using external resistors [3034], [3036] in series to the input pins. All required clock signals are generated on the FEBE Digital backend and only the audio data (A_DAT-line) are routed from MOBO analog board to FEBE Digital backend for further processing.

The transformation of digital audio back into the analog domain is done by AD1852 [7004]. All necessary clock signals are coming from the FEBE digital backend and digital audio data (D_DATA0-line) are converted into analog signals, which are available at pin 12 & 13 (right channel) and pin 16 & 17 (left channel) of [7004]. Afterwards an Op-Amp. [7005] (line driver & level adaptation) and a low-pass-filter to increase signal performance (noise, distortions,...). is passed. Then both signals (ALDAC & ARDAC) are directly routed to the rear cinch output and also used in the audio-I/O for further processing.

The DAC has also a mute possibility, which can be activated by setting pin 8 to high via [7006]. This mute is controlled either by the FEBE digital backend (D_IKLL-line), IMUTE-signal from the slave μ P or the IPFAIL-signal from power-supply-unit.

In addition to that the cinch outputs is killed (muted) in case of digital silence (D_DATA0-line zero) by the circuit around [7045] and [7002] via the BKILL-line.

9.1.13 Video-routing

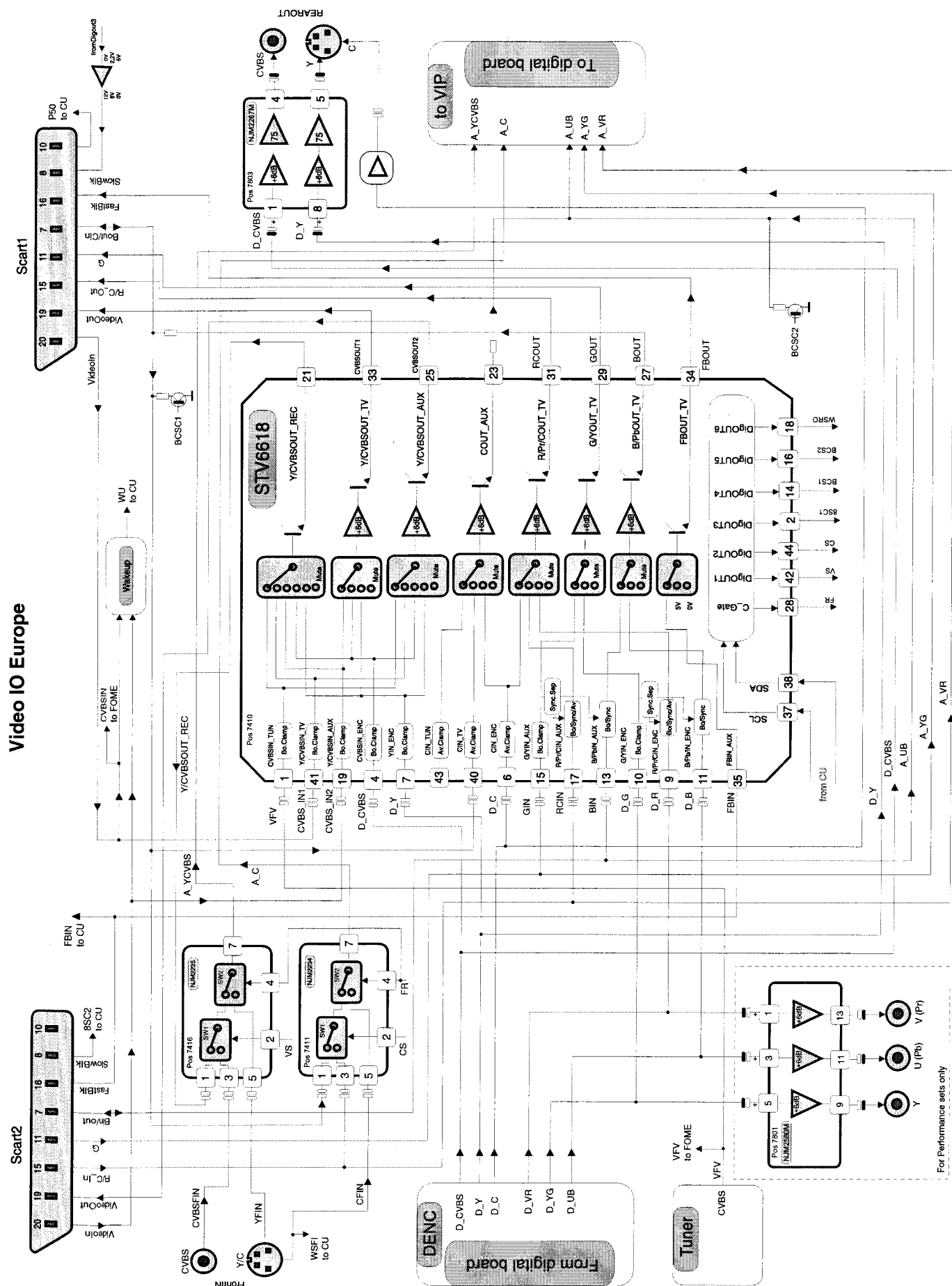


Figure 9-2 MOBO Video IO Eu

9.2.3 Frontend part

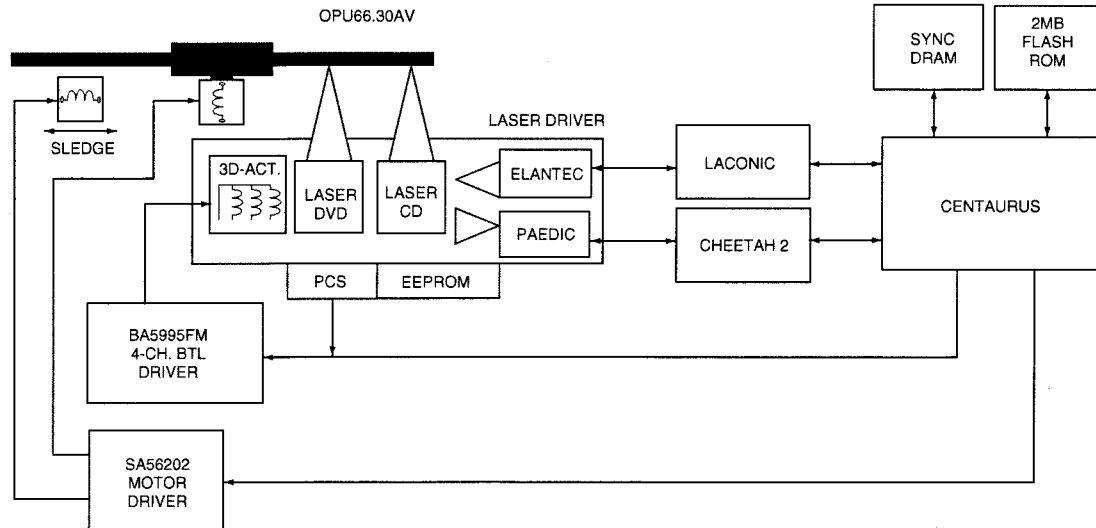


Figure 9-3 Servo Block

This section describes briefly the functional behavior of the engine. It performs all basic servo and data processing function:

- it reads data from the disc
- it writes data to the disc - it controls all other functions like tray control, start/stop the disc, tracking, jumping, and communication to the host.
- encodes and multiplexes analogue video and digital uncompressed audio (I²C) into a MPEG2 stream
- decodes the MPEG2 stream into analogue and digital audio and into analogue video

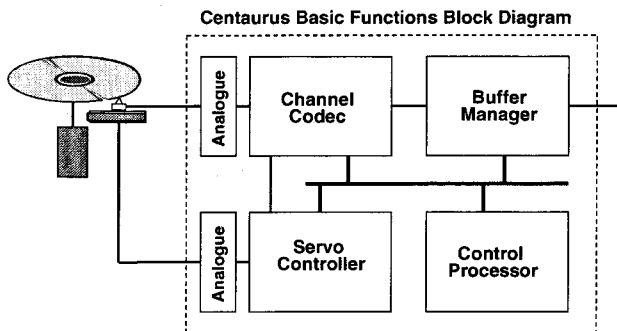
Centaurus 1.5 (PNX7850E)

Figure 9-4 Centaurus

The Centaurus [7500] is a highly integrated IC that controls all the functions of the drive. It interfaces via the IDE bus to the MPEG backend and incorporates the following functions.

- CD/DVD channel decoder/encoder
- CD/DVD data block decoder/encoder
- Buffer Manager
- Digital Servo processor using digital signal processor
- Drive system microprocessor based on MIPS core

The MIPS microcontroller uses Flash ROM for the firmware and SRAM to execute the program. SDRAM is provided for the encoding/decoding function block of centaurus [7500]. 2 Mbytes of data buffer size is available inside the IC for data storage.

Cheetah 2 (TZA1047)

The Cheetah2, [7201] is an analogue pre-processing for the diode signals coming from the OPU. It contains an amplifier with programmable gain that amplifies the RF signal to adapt the output for the different reflectivity of the various discs. The

tracking signals are filtered and normalized. In addition the IC contains a timing circuit for the sample and holding circuits and for switching the various blocks between read and write. Supporting functions such as laser control and offset control are incorporated. Communication to and from the IC is based on a fast two-wire serial bus that works according to the I²C interface protocol.

Laconic (TZA1042)

The main function of the Laconic, [7300] is to control the laser power. The IC forms a closed control loop in combination with the Elantec located on the OPU. It compensates aging and temperature of the laser. Furthermore it forms a fingerprint correction loop. It also acts as bridge between I²C and serial bus of the Elantec laser driver on the CPU.

Optical Pick-up Unit

The OPU66 is a dual laser Optical Pick-up Unit for the DVD+RW/+R. It consists of a 3-D actuator for focusing, radial tracking and tilt correction.

- 650nm laser for DVD
- 780nm laser for CD

On the interconnecting flex several electrical components are mounted.

- Elantec: programmable laser diode power driver

- Paedic: integrated photo detector with programmable gain pre-amplifier
- Eeprom: containing a number of values representing adjustments belonging to the OPU

The laser control and diode signal processor ICs together with an Eeprom are mounted on the OPU flex.

The laser control IC generates the DVD laser read and writing signals needed for reading DVD discs and writing DVD+RW/+R discs (write strategies of DVD+RW/+R discs).

The diode signal processor is an analogue pre-processor adapted for the CD and CD-R/RW read function.

The Eeprom contains information about writing current, writing strategies and other parameters belonging to the OPU.

Motor and Servo drivers

The disc, tray and sledge motors are driven by a one-chip motor driver SA56202 [7402] while the 3-D actuator is driven & control by a 4-channel BTL driver BA5995FM [7409] and some low power Ops amplifier LM358D [7401], [7403] and [7405].

The complete Video-I/O-switching is basically realized by the matrix switch STV6618 [7410], which is controlled via I²C-bus by the slave μ P. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6 dB-amplification and a 75 Ohms driver-stage inside. This IC includes also several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from Tuner frontend (VFV), the input from Scart 1 (YCVBSIN1) or the signal from Scart 2 (YCVBSIN2). Afterwards the signal passes another switch [7416] in which a selection between signals from the front or the preselected ones are done. Likewise a second switch [7411] selects between Scart 1 (CIN) and Scart 2 (RCIN) and front (CFIN). The output signals of [7416] A_YCVBS- and [7411] A_C-lines are fed to the VIP on FEBE Digital backend for further processing.

The R/G/B-inputs and the Fast-Blanking-line from Scart 2 are directly routed to the FEBE Digital backend. These signals are also available on the corresponding input-pins of the STV6618 to enable a loop-through in AV-Standby. In this mode the set has to behave like a cable between the two Scart-connectors. AV-Standby is activated either by a high level on pin 8 of Scart 2 (active device is present) or by the WU-line (wake up). This signal is generated out of the circuit around [7401], [7402] & [7404] and will become high if there is a signal on pin 20 of Scart 1- or Scart 2. The detection of the input level on pin 8 of Scart 2 (8SC2) is done via an analog input of the slave μ P (less than 2V means inactive; 4,5V to 7V determines a source with 16:9 picture-ratio and greater than 9,5V is an active 4:3 source).

All signals from the FEBE Digital backend (D_VR, D_YG, D_UB, D_C, D_Y and D_CVBS) are routed to the proper inputs of the STV6618 for amplification and driving purpose before they can be seen on the appropriate Scart outputs.

Parallel to this the D_CVBS- and the D_Y-line are passing a 6 dB-amplifier and driver-IC [7803] and are then routed to the CVBS-Cinch and Y/C-out rear. The chroma signal for this Y/C out is coming from the STV6618.

The detection of the picture ratio information on the Y/C-input front is made by measuring the DC-level on the Chroma signal via analog input of the slave μ P (WSFI-line). In case the level is higher than 3,5V the input signal is a 16:9 source. If the level is lower than 2,4V the picture ratio is 4:3.

Likewise for the D_VR-, D_YG- and D_UB- lines are passing a 6dB-amplifier and driver-IC [7801] and routed as component video YUV (For Performance set only).

The control of the switching voltage (Pin 8 of Scart 1) is done via 3-level-pin (pin 2) of the STV6618 [7408] and the transistors [7405], [7407] & [7409]. A low on pin 2 of [7408] causes around 11V on pin 8-Scart 1 (e.g. source with 4:3 picture-ratio active). Medium level (2,5V) on pin 2 of the STV6618 generates medium level (approx. 6V) on pin 8-Scart 1 (e.g. active source with 16:9) and a high on pin 2 of the STV6618 pushes pin 8-Scart 1 to low (e.g. inactive).

9.1.14 Analog Follow-Me

This circuit compares the video signal from the Tuner frontend (VFV) of the recorder with that one of the connected TV-set (CVBSIN). The TV set delivers the signal via Scart-cable. A comparator [7951] and several additional parts [7953], [7954], ... are used to compare the two video signals. In case of both input signals are equal the output-line of this circuit (FOME) is set to low. Detection is made via an input port of the slave μ P.

9.2 VAU8041 (FEBE / AV3.5) Module

9.2.1 General

The Video Recorder Drive VAU8041 module known as FEBE 1.0 with AV3.5 drive is actually the Video Recorder Drive VAD8041 module with and extended board. The new FEBE board contains both the frontend Servo and backend Digital

portion. Being physically on the same board the IDE connector is no longer required.

The recorder engine performs all basic servo tasks - reading and writing data on the disc and controls all functions like tray control, start/stop the disc, tracking, jumping and communicating to the host.

Mechanically, the module consists of a motorized tray loader that contains the dual laser optical pickup unit and a board that contains all the electronics needed to control the drive and interfacing to the MPEG encoder/decoder backend Digital portion

The backend Digital portion encodes and multiplexes analogue video and digital uncompressed audio (I²S) into an MPEG2 stream. This MPEG2 stream is formatted, to be recorded by the DVD+RW/+R engine. In playback, it decodes the MPEG2 stream into analogue and digital audio and into analogue video. There is a temperature sensor included in the drive that prevents malfunction or destruction of the drive in case the temperature inside the drive gets too high.

9.2.2 Power Supply

The +3V3, +5V, -5V and +12V come from the PSU of the MOBO analog board via connector [1905] while the +1V8 core voltage is generated on the board by a low voltage buck controller [7929]. It provides the control for DC-DC power solution producing a +1.8V output power over a wide current range. The NCP1570-based solution is powered from +12V with the output derived from the +3V3 supply. It contains all required circuitry for a synchronous NFET [7927-1] and [7928-2] buck regulator.

9.2.4 Backend Digital part

Record Mode

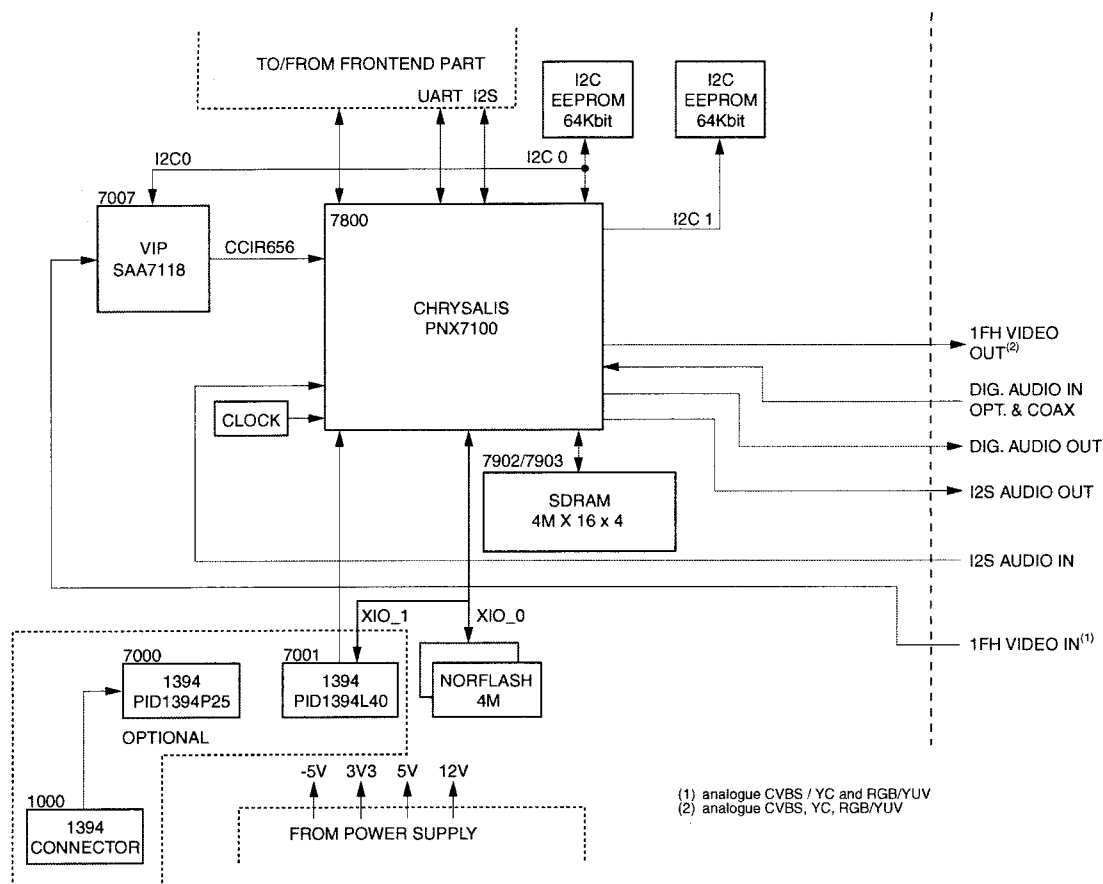


Figure 9-5 Chrysalis Block

Video Part

The analogue video input signals CVBS, YC and YUV/RGB (RGB for Euro and YUV for USA) from the MOBO analog board are routed from connector [1901] to IC [7007] SAA7118, Video Input Processor.

The digital video input signals are routed from the DV-in connector [1000] via ICs [7000], 1394 PHY and [7001] 1394 LINK to Chrysalis PNX7100 [7800].

The multi-standard Video Input Processor VIP, [7007] encodes the analogue video to digital stream (CCIR656 format). It provides filtering of the analogue signals and separation of luminance and chrominance by a comb filter. The output stream, named ITU_IN(7:0), is then routed to the Chrysalis [7800]. This IC encodes and decodes the digital video stream into/from MPEG2 format.

Audio Part

I²S audio is sent from the MOBO analog board to the Chrysalis [7800] via connector [1902]. The Chrysalis [7800] compresses the I²S audio data into an MPEG1-L2/AC3 audio stream.

Front-end I²S

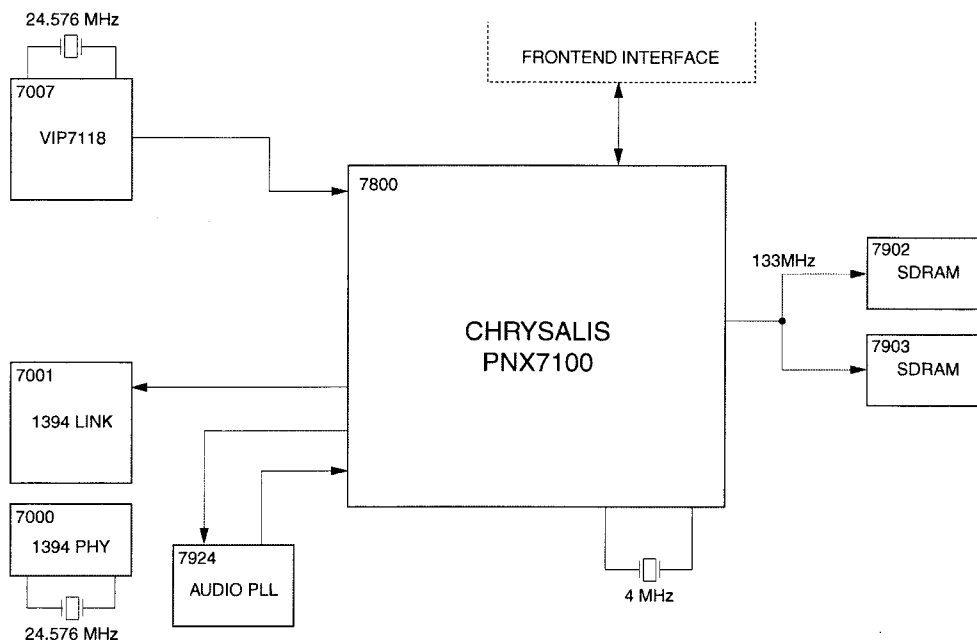
Chrysalis [7800] interfaces directly with the Centaurus [7500] and buffers the in- and out-going data streams.

In the Chrysalis [7800], the video MPEG2 stream and the audio AC3 stream are multiplexed into an I²S stream. The serial data are sent to the Centaurus [7500] for recording.

Playback Mode

During playback, the serial data from the Centaurus [7500] is going directly to the Chrysalis [7800] via the serial front-end I²S interface. The Chrysalis [7800] is an MPEG CoDec and has the following outputs:

- To the MOBO analog board: analogue video RGB, YC, CVBS on connector [1901].
- I²S audio (PCM format) on connector [1902].
- SPDIF audio (digital audio output) on connector [1902].
- Communication gateway (RS232) on connector [1907].

Clock Distribution**Figure 9-6 Chrysalis Clock**

The Chrysalis [7800] has a complex clock system, which is needed to support the processes running at different frequencies such as video decoding, audio decoding or peripheral I/O devices etc. To ensure a synchronous initialization of all the registers and state machines, all the PLLs are switched to their default frequency and the reset sequence is run at 4MHz. Then when the booting control unit is correctly initialized and once it has captured all the booting parameters, it sets the PLLs to its functional frequency to allow the modules to run at their nominal frequencies. Thanks to a clock blocking mechanism, the frequency switching is glitch free.

System clocks:

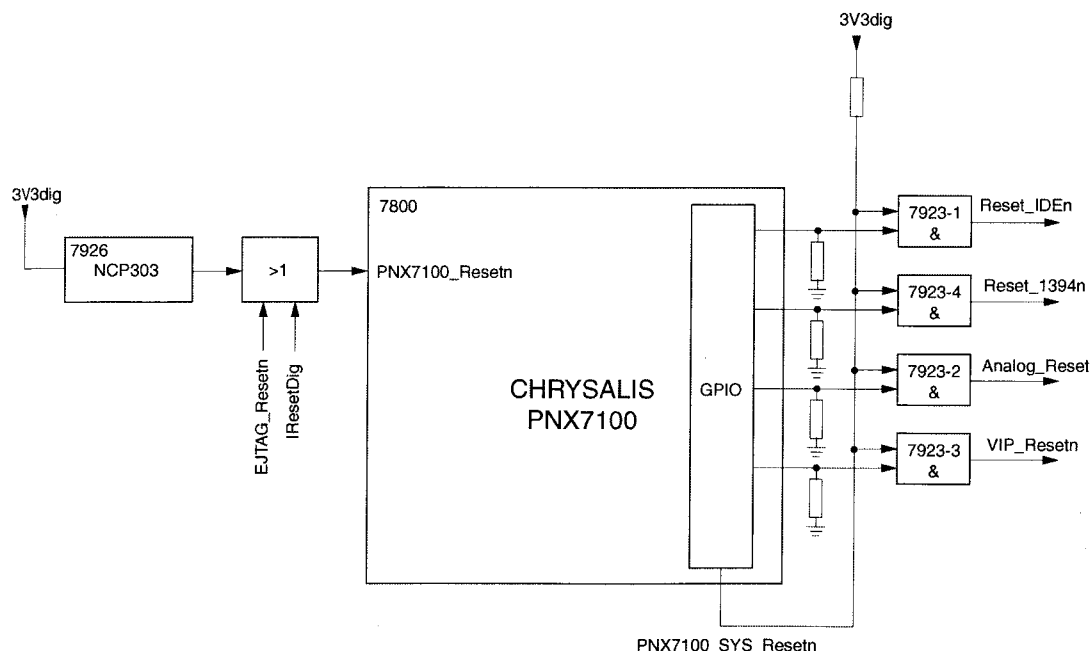
- PNX7100 [7800], pins AF9 and AF10 : 4MHz provided by the crystal oscillator [7804]
- SAA7118 [7007], pins A3 and B4 : 24.576 MHz provided by crystal [1002]

- SDRAM [7902] and [7903], pin 38 : 133MHz provided by PNX7100
- 1394-LINK [7001], pin 88 : 49.152MHz provided by 1394-PHY
- 1394-PHY [7000], pin 59 and 60 : 24.576MHz provided by crystal [1001]

Memory

Several memories are used on the Chrysalis [7800]:

- EEPROM [7904] : this memory contains all the necessary boot parameters of the board
- EEPROM [7905] : this memory contains all the necessary parameters for the application
- FLASH [7900] : this memory contains the application, diagnosis and service software

Reset**Figure 9-7 Chrysalis reset**

The voltage detector NCP303LSN290 [7926] provides the reset signal PNX7100_RESETh (active: low) with the correct timing behavior. This circuitry functions as a Power-On Reset (POR) module, which detects the minimum functional voltage that is needed by the device. It also detects any voltages drop. When the power voltage is outside the nominal range, a reset signal is generated by the POR module and fed to the reset module which controls the individual reset of the different peripherals and processing units.

There are two control lines which can overrule this reset signal:

- IRESET_DIG (controlled by the slave μ P on the MOBO Analog board)
- EJTAG_RESETh (only for production)

They can pull the output of the NCP303LSN29 [7926] down via a shottky diode.

So when the output signal PNX7100_RESETh is low, the board will reset. When this signal is high, the board is up and running. The PNX7100_SYS_RESETh is a general enabling signal for the different reset lines. All other reset lines are directly driven from Chrysalis [7800] port pins (eg. MPIO13_IDE1_RESETh). All reset lines are logically connected via 74LVC08AD [7923] AND-gates. If both reset signals are low, all other external devices are initialized.

I²C Bus

The Chrysalis [7800] is the master of all the I²C bus (during reset, external I²C masters are allowed). The following ICs are controlled by the I²C bus:

- [7904] Boot Eeprom
- [7905] NVRAMs
- [7007] VIP

9.2.5 I/O Connectors

Audio IO Connector [1902]

The Audio In/Out (AIO) connector is used to interchange digital audio signals between MOBO Analog and FEBE Backend Digital portion.

Video IO Connector [1901]

The Video In/Out (VIO) connector is used to interchange analogue video signals between MOBO Analog and FEBE Backend Digital portion.

9.2.6 Service UART Interface

Transistor 7950, BC847BS is used to make a level conversion from microprocessor (LVTTTL) to +/-5V (compatible with most RS232 interfaces) and vice versa. The control line MPIO19_CTL_SERVICE is used to activate service and diagnostic SW at start up procedure. The connectivity is provided via an external service tool.

9.3 Lecolite U4.01L Module

9.3.1 General

Leco U4.0L module is a DVD recorder module that houses a recorder drive VAU 8041 to a simpler Frontend- Backend Board (Leco). Being physically on the same board the IDE connector is no longer required.

The recorder engine performs all basic servo tasks - reading and writing data on the disc and controls all functions like tray control, start/stop the disc, tracking, jumping and communicating to the host.

Mechanically, the module consists of a motorized tray loader that contains the dual laser optical pickup unit and a board that contains all the electronics needed to control the drive and interfacing to the MPEG encoder/decoder backend Digital portion

The backend Digital portion encodes and multiplexes analogue video and digital uncompressed audio (I²S) into an MPEG2 stream. This MPEG2 stream is formatted, to be recorded by

the DVD+RW/+R engine. In playback, it decodes the MPEG2 stream into analogue and digital audio and into analogue video. There is a temperature sensor included in the drive that prevents malfunction or destruction of the drive in case the temperature inside the drive gets too high.

9.3.2 Power Supply

The +3V3, +5V, -5V and +12V come from the PSU of the MOBO analog board via connector [1302] while the +1V2 core voltage is generated on the board by a low voltage buck controller [7301]. The NCP1571-based solution is powered from +12V with the output derived from the +3V3 supply. It contains all required circuitry for a synchronous NFET [7300-1] and [7300-2] buck regulator.

9.3.3 Frontend part

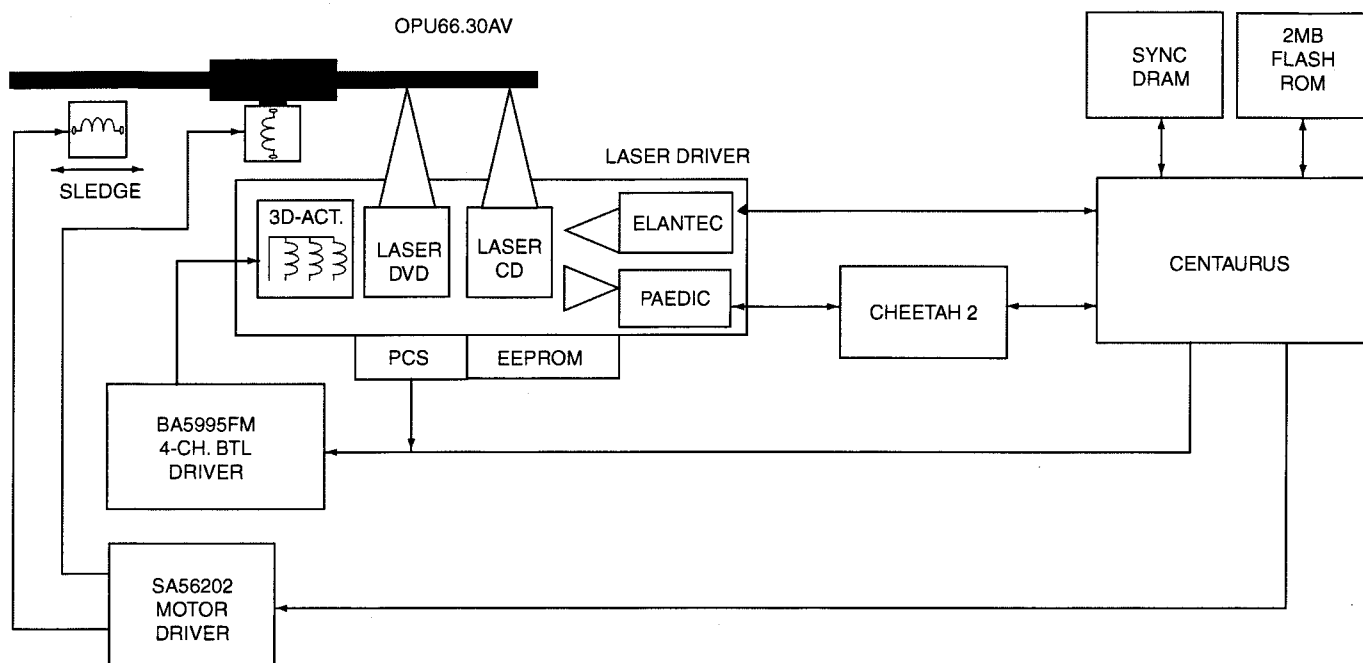


Figure 9-8 Lecolite Servo Block

This section describes briefly the functional behavior of the engine. It performs all basic servo and data processing function:

- it reads data from the disc
- it writes data to the disc - it controls all other functions like tray control, start/stop the disc, tracking, jumping, and communication to the host.
- encodes and multiplexes analogue video and digital uncompressed audio (I²C) into a MPEG2 stream
- decodes the MPEG2 stream into analogue and digital audio and into analogue video

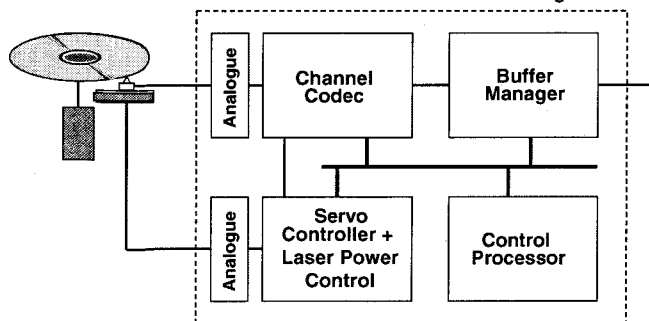
Centaurus 2 (PNX7860E)**Centaurus Basic Functions Block Diagram**

Figure 9-9 Centaurus

The Centaurus [7501] is a highly integrated IC that controls all the functions of the drive. It interfaces via the IDE bus to the MPEG backend and incorporates the following functions.

- CD/DVD channel decoder/encoder
- CD/DVD data block decoder/encoder
- Buffer Manager
- Digital Servo processor using digital signal processor
- Drive system microprocessor based on MIPS core
- Laser Power Control

The MIPS microcontroller uses Flash ROM for the firmware and SRAM to execute the program. SDRAM is provided for the encoding/decoding function block of centaurus [7501]. 2

Mbytes of data buffer size is available inside the IC for data storage.

Cheetah 2 (TZA1047)

The Cheetah2, [7201] is an analogue pre-processing for the diode signals coming from the OPU. It contains an amplifier with programmable gain that amplifies the RF signal to adapt the output for the different reflectivity of the various discs. The tracking signals are filtered and normalized. In addition the IC contains a timing circuit for the sample and holding circuits and for switching the various blocks between read and write. Supporting functions such as laser control and offset control are incorporated. Communication to and from the IC is based on a fast two-wire serial bus that works according to the I²C interface protocol.

Optical Pick-up Unit

The OPU66 is a dual laser Optical Pick-up Unit for the DVD+RW/+R. It consists of a 3-D actuator for focusing, radial tracking and tilt correction.

- 650nm laser for DVD
- 780nm laser for CD

On the interconnecting flex several electrical components are mounted.

- Elantec: programmable laser diode power driver and write strategy IC
- Paedic: integrated photo detector with programmable gain pre-amplifier
- Eeprom: containing a number of values representing adjustments belonging to the OPU

The laser control and diode signal processor ICs together with an Eeprom are mounted on the OPU flex.

The laser control IC generates the DVD laser read and writing signals needed for reading DVD discs and writing DVD+RW/+R discs (write strategies of DVD+RW/+R discs).

The diode signal processor is an analogue pre-processor adapted for the CD and CD-R/RW read function.

The Eeprom contains information about writing current, writing strategies and other parameters belonging to the OPU.

Motor and Servo drivers

The disc, tray and sledge motors are driven by a one-chip motor driver SA56202 [7402] while the 3-D actuator is driven &

control by a 4-channel BTL driver BA5995FM [7409] and some low power Ops amplifier LM358D [7401], [7403] and [7405].

9.3.4 Backend Digital part

General

The LECO IC is basically the Chrysalis but it supports only one IDE Bus resulting in a smaller footprint.

Record Mode

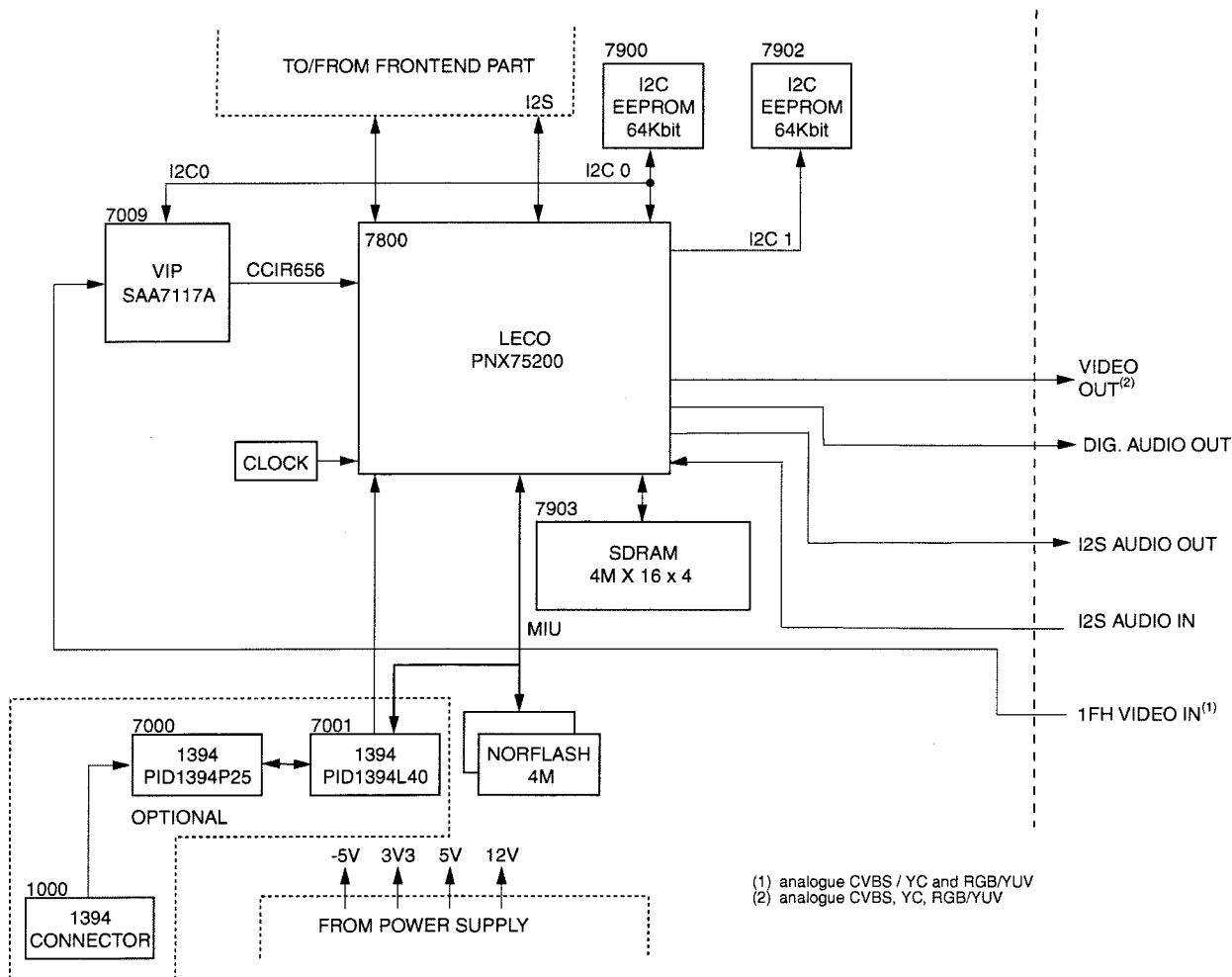


Figure 9-10 Locolite Block

Video Part

The analogue video input signals CVBS, YC and YUV/RGB (RGB for Euro and YUV for USA) from the MOBO analog board are routed from connector [1902] to IC [7009] SAA7117A, Video Input Processor.

The digital video input signals are routed from the DV-in connector [1000] via ICs [7000], 1394 PHY and [7001] 1394 LINK to Leco PNX7520 [7800].

The multi-standard Video Input Processor VIP, [7009] encodes the analogue video to digital stream (CCIR656 format). It provides filtering of the analogue signals and separation of luminance and chrominance by a comb filter. The output stream, is then routed to the Leco IC [7800]. This IC encodes and decodes the digital video stream into/from MPEG2 format.

Audio Part

I²S audio is sent from the MOBO analog board to the Leco IC [7800] via connector [1903]. The Leco IC [7800] compresses the I²S audio data into an Dolby Digital audio stream.

Front-end I²S

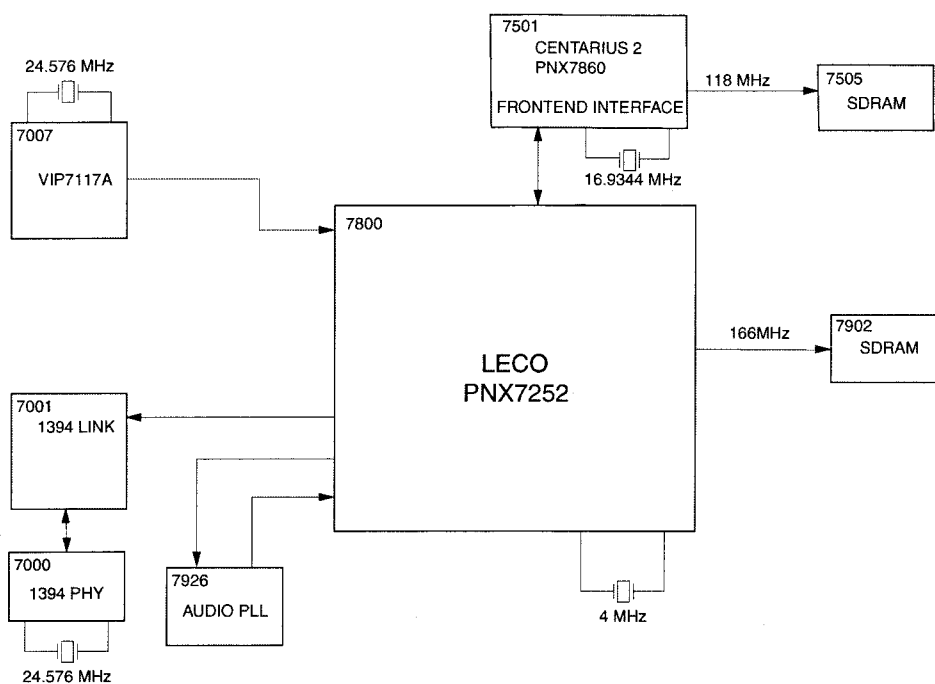
Leco IC [7800] interfaces directly with the Centaurus [7500] and buffers the in- and out-going data streams.

In the Leco IC [7800], the video MPEG2 stream and the audio AC3 stream are multiplexed into an I²S stream. The serial data are sent to the Centaurus [7500] for recording.

Playback Mode

During playback, the serial data from the Centaurus [7500] is going directly to the Leco IC [7800] via the serial front-end I²S interface. The Leco IC [7800] outputs the followings:

- analogue video RGB, YC, CVBS on connector [1902].
- I²S audio (PCM format) on connector [1903].
- SPDIF audio (digital audio output) on connector [1900].

Clock Distribution**Figure 9-11 Lecolite Clock****System clocks:**

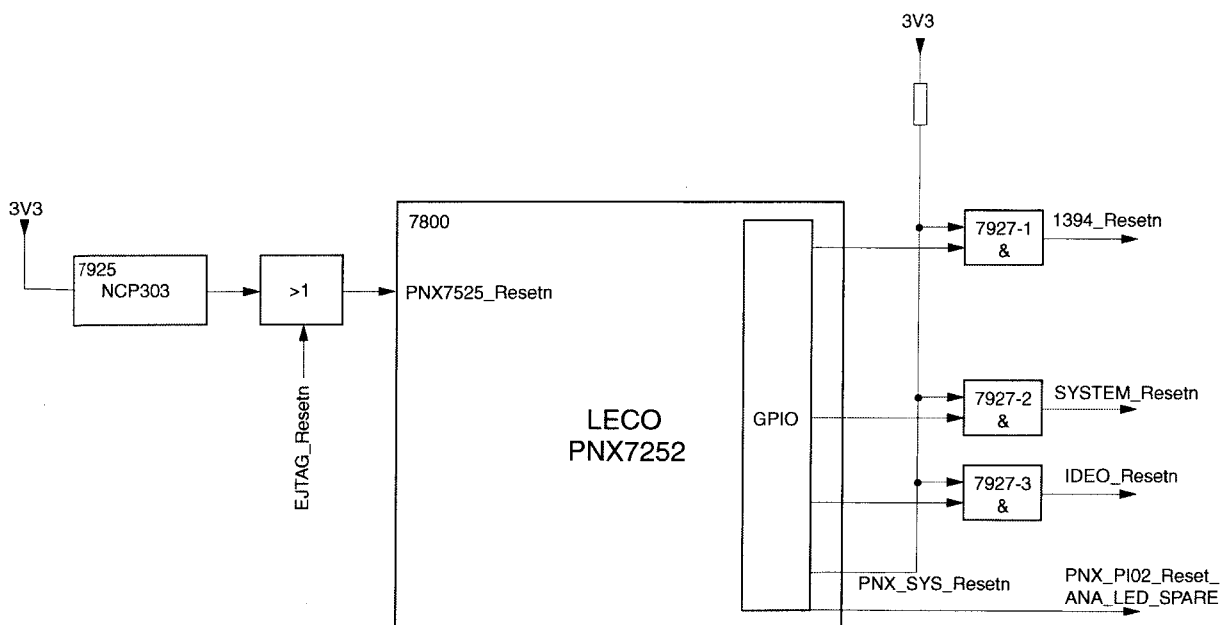
- PNX7252 [7800], pins T8 and N10 : 4MHz provided by the crystal oscillator [7926]
- SAA7117A [7009], pins A3 and B4 : 24.576 MHz provided by crystal [1002]
- SDRAM and [7903], pin 38 : 133MHz provided by PNX7252
- 1394-LINK [7001], pin 88 : 49: 152MHz provided by 1394-PHY
- 1394-PHY [7000], pin 59 and 60 : 24.576MHz provided by crystal [1001]
- SDRAM [7505], pin 35: 118MHz provided by Centaurus [7501]

- Centaurus [7501], pinV1/V2: 16.9344MHz provided by crystal

Memory

Several memories are used on the Leco IC [7800]:

- EEPROM [7902] : this memory contains all the necessary boot parameters of the board
- EEPROM [7900] : this memory contains all the necessary parameters for the application
- FLASH [7904] : this memory contains the application, diagnosis and service software

Reset**Figure 9-12 Lecolite Reset**

Upon power up, rest IC NCP303LSN290 [7925] provides a reset pulse to Leco IC PNX7252. This pulse is also generated whenever power supply dips below 2.9V for a certain amount of time. Leco can also be reset by via EJTAG for SW development purpose. After reset is released, the Leco IC will operate 4 other reset lines. 1394_RESETN resets the 1394 physiacl and link ICs. SYSTEM_RESETN, resets the flash and enable the VIP. IDEO_RESETN will reset the Centaurus 2 IC. The final line, PNX_P102_ORESET_ANA_LED_SPARE resets the ASP found on the MOBO board.

I²C Bus

The Leco [7800] is the master of all the I²C bus (during reset, external I²C masters are allowed). The following ICs are controlled by the I²C bus:

- [7902] Boot Eeprom
- [7900] NVRAMs
- [7009] VIP

and on the MOBO board

- [1700] Tuner
- [7410] Video Switch
- [7600] MSP

Audio IO Connector [1903]

The Audio In/Out (AIO) connector is used to interchange digital audio signals between MOBO Analog and FEBE Backend.

Video IO Connector [1902]

The Video In/Out (VIO) connector is used to interchange analogue video signals between MOBO Analog and FEBE Backend portion.

COMM Connector [1912]

This connector carries the I2C bus and reset line to the MOBO amongst other signal.

9.3.5 Service UART Interface

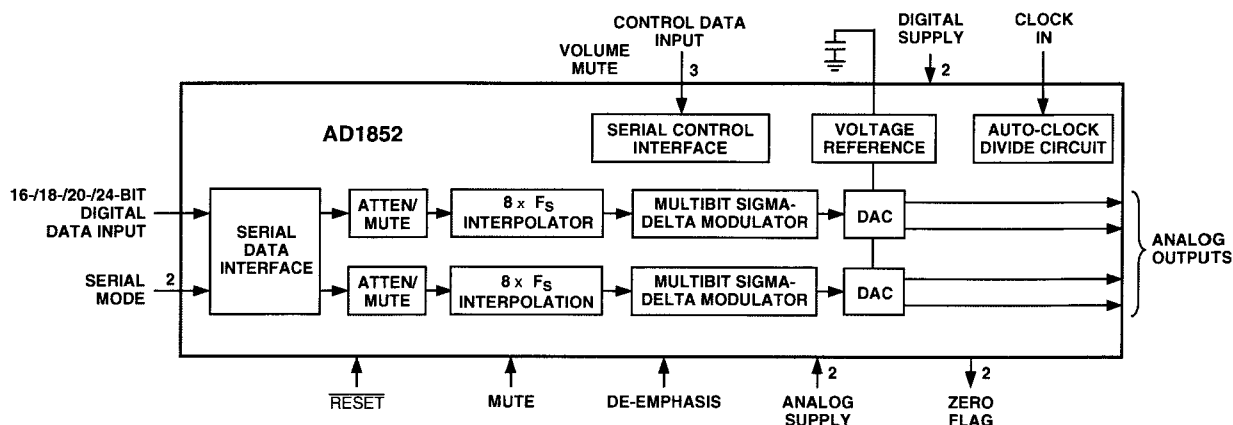
Transistors 7928,7930 and 7950 are used to make a level conversion between LVTTTL and 5V (compatible with most RS232 interfaces) and vice versa. The control line PNX_PIOR_SERVICE_MODE_1394_POWERDOWN2 is used to activate service and diagnostic SW at start up. The connectivity is provided via an external service tool.

9.4 IC Descriptions

9.4.1 MOBO Board

IC7004: AD1852 MOBO Board, Digital to Analogue Converter

FUNCTIONAL BLOCK DIAGRAM



*Patents Pending

Figure 9-13

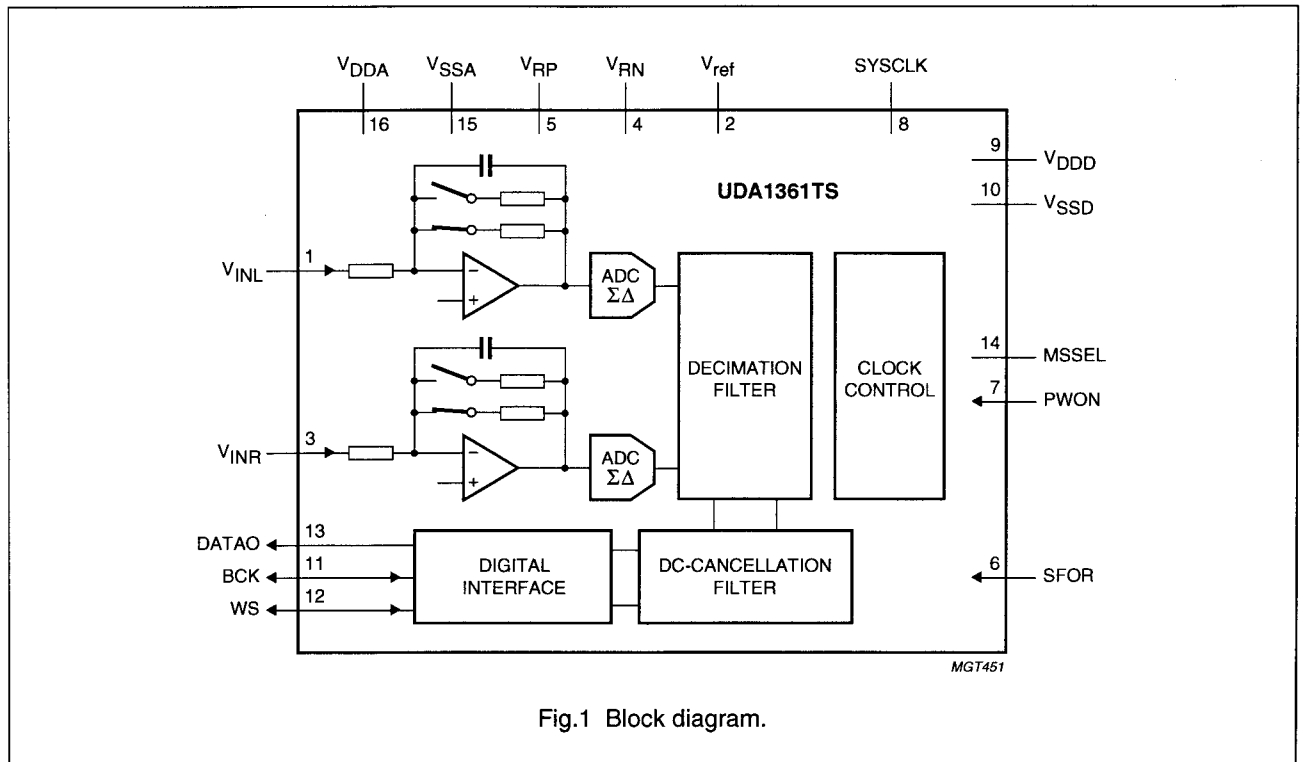
PIN FUNCTION DESCRIPTIONS

Pin	Input/Output	Pin Name	Description
1	I	DGND	Digital Ground.
2	I	MCLK	Master Clock Input. Connect to an external clock source at either 256 F _S , 384 F _S , 512 F _S , 768 F _S , or 1024 F _S .
3	I	CLATCH	Latch Input for Control Data. This input is rising-edge sensitive.
4	I	CCLK	Control Clock Input for Control Data. Control input data must be valid on the rising edge of CCLK. CCLK may be continuous or gated.
5	I	CDATA	Serial Control Input, MSB first, containing 16 bits of unsigned data per channel. Used for specifying channel-specific attenuation and mute.
6		NC	No Connect.
7	I	192/48	Selects 48 kHz (LO) or 192 kHz Sample Frequency.
8	O	ZEROR	Right Channel Zero Flag Output. This pin goes HI when Right Channel has no signal input for more than 1024 LR Clock Cycles.
9	I	DEEMP	De-Emphasis. Digital de-emphasis is enabled when this input signal is HI. This is used to impose a 50 µs/15 µs response characteristic on the output audio spectrum at an assumed 44.1 kHz sample rate. Curves for 32 kHz and 48 kHz sample rates may be selected via SPI control register.
10	I	96/48	Selects 48 kHz (LO) or 96 kHz Sample Frequency.
11, 15	I	AGND	Analog Ground.
12	O	OUTR+	Right Channel Positive Line Level Analog Output.
13	O	OUTR \bar{D}	Right Channel Negative Line Level Analog Output.
14	O	FILTR	Voltage Reference Filter Capacitor Connection. Bypass and decouple the voltage reference with parallel 10 µF and 0.1 µF capacitors to the AGND.
16	O	OUTL \bar{D}	Left Channel Negative Line Level Analog Output.
17	O	OUTL+	Left Channel Positive Line Level Analog Output.
18	I	AVDD	Analog Power Supply. Connect to Analog 5 V Supply.
19		FILTB	Filter Capacitor Connection. Connect 10 µF capacitor to AGND (Pin 15).
20	I	IDPM1	Input Serial Data Port Mode Control One. With IDPM0, defines 1 of 4 serial modes.
21	I	IDPM0	Input Serial Data Port Mode Control Zero. With IDPM1, defines 1 of 4 serial modes.
22	O	ZEROL	Left Channel Zero Flag Output. This pin goes HI when Left Channel has no signal input for more than 1024 LR Clock Cycles.
23	I	MUTE	Mute. Assert HI to mute both stereo analog outputs. Deassert LO for normal operation.
24	I	RESET	Reset. The AD1852 is reset on the rising edge of this signal. The serial control port registers are reset to the default values. Connect HI for normal operation.
25	I	L/RCLK	Left/Right Clock Input for Input Data. Must run continuously.
26	I	BCLK	Bit Clock Input for Input Data. Need not run continuously; may be gated or used in a burst fashion.
27	I	SDATA	Serial Input, MSB first, containing two channels of 16, 18, 20, and 24 bits of twos complement data per channel.
28	I	DVDD	Digital Power Supply Connect to digital 5 V supply.

Figure 9-14

IC7008: UDA1361TS MOBO Board, Analogue to Digital Converter

BLOCK DIAGRAM



PINNING

SYMBOL	PIN	DESCRIPTION
V_{INL}	1	left channel input
V_{ref}	2	reference voltage
V_{INR}	3	right channel input
V_{RN}	4	negative reference voltage
V_{RP}	5	positive reference voltage
SFOR	6	data format selection input
PWON	7	power control input
SYSCLK	8	system clock 256, 384, 512 or 768f _s
V_{DDD}	9	digital supply voltage
V_{SSD}	10	digital ground
BCK	11	bit clock input/output
WS	12	word select input/output
DATAO	13	data output
MSSEL	14	master/slave select
V_{SSA}	15	analog ground
V_{DDA}	16	analog supply voltage

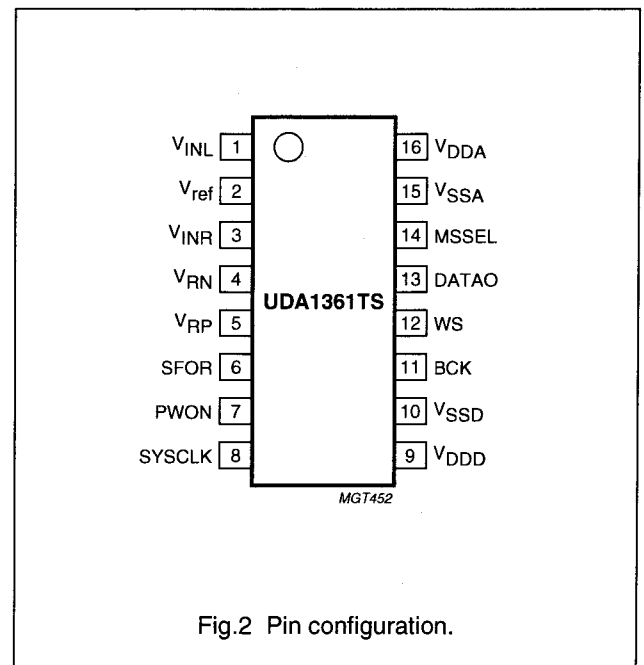
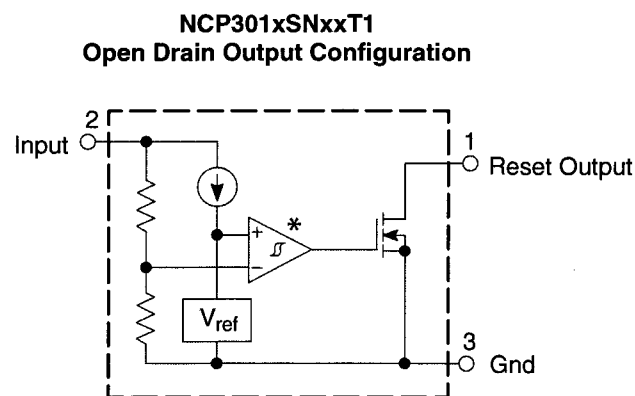


Figure 9-15

IC7100 NCP301LSNxx MOBO Board, Reset Circuit



* The representative block diagrams depict active low reset output 'L' suffix devices. The comparator inputs are interchanged for the active high output 'H' suffix devices.

This device contains 25 active transistors.

Figure 1. Representative Block Diagrams

Figure 9-16

IC7107 TMP87CM74AF MOBO Board, Microprocessor

Block Diagram

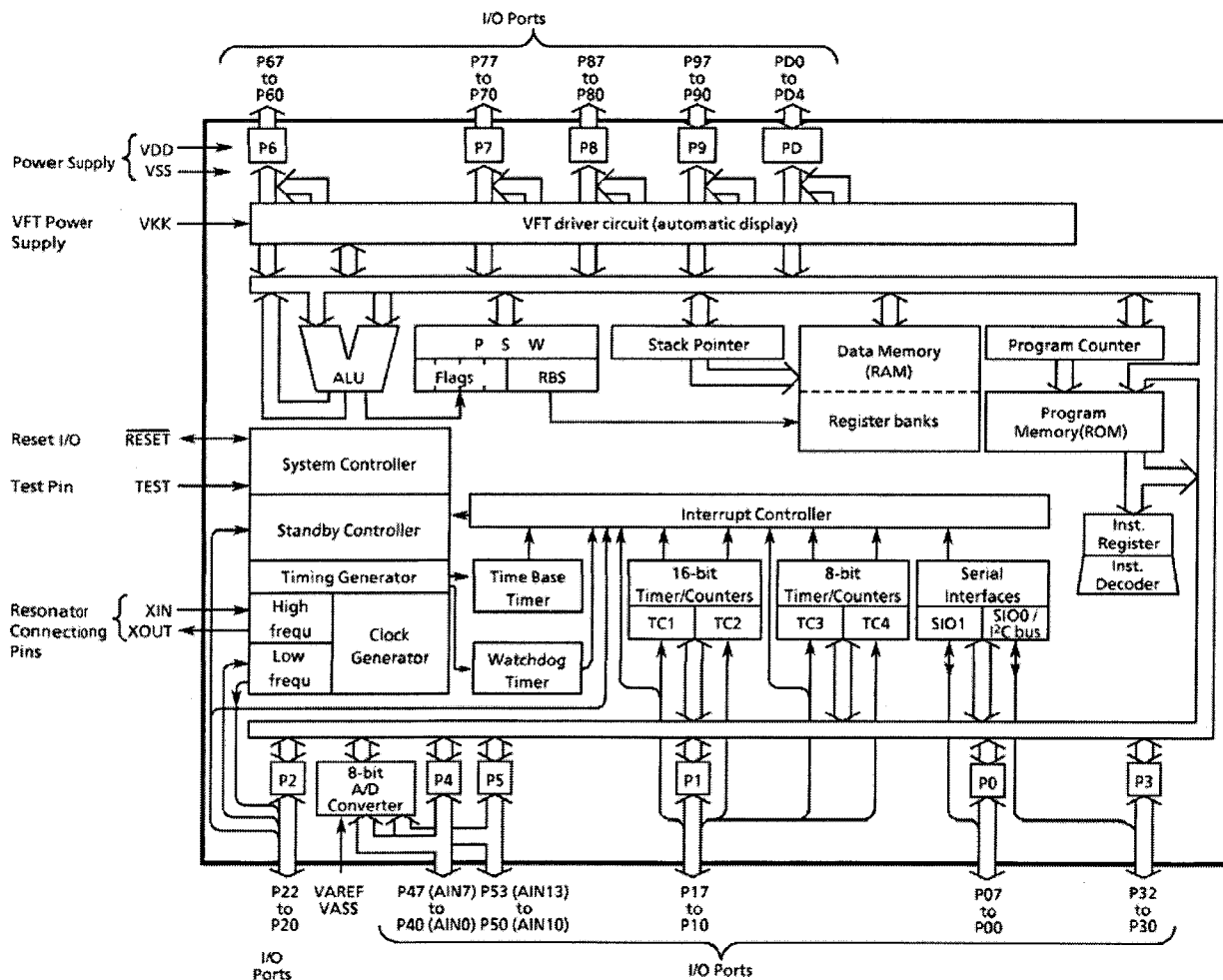


Figure 9-17

Pin Function

Pin Name	Input / Output	Function	
P07 to P03	I/O	Two 8-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a SIO input/output, an External interrupt input, a timer/counter input, the latch must be set to "0". When used as a PPG output or divider output, the latch must be set to "1".	
P02 (SO1)	I/O (Output)		SIO1 serial data Output
P01 (SI1)	I/O (Input)		SIO1 serial data Input
P00 (SCK1)	I/O (I/O)		SIO1 serial clock input/output
P17 (INT4/TC3)	I/O (Input)		External interrupt input 4 or Timer/Counter 3 input
P16 (INT2)			External interrupt input 2
P15 (INT3/TC1)			External interrupt input 3 or Timer/Counter 1 input
P14 (TC4/PDO/PWM)			Timer counter 4 input or 8-bit programmable divider output or 8-bit PWM output
P13 (DVO)	I/O (Output)		Divider output
P12 (TC2/PPG)	I/O (I/O)		Timer counter 2 input or Programmable pulse generator output
P11 (INT1)	I/O (Input)		External interrupt input 1
P10 (INT0)			External interrupt input 0
P22 (XTOUT)	I/O (Output)	3-bit input/output port with latch. When used as input port, or external interrupt input, STOP mode release signal input, the latch must be set to "1".	Resonator connecting pins (32.768 kHz). For inputting external clock, XTIN is used and XTOUT is opened.
P21 (XTIN)	I/O (Input)		External interrupt input 5 or STOP mode release signal input
P20 (INT5/STOP)			
P32 (SCK0)	I/O (I/O)	3-bit programmable input/output ports (Sink open drain).	SIO0 serial clock input/output
P31 (SDA/SO0)	I/O (I/O/Output)	Each bit of these ports can be individually configured as an input or an output under software control. When used as a I2C input/output, the latch must be set to "1".	I2Cbus serial data input/output or SIO0 serial data output
P30 (SCL/SI0)			I/O (I/O/Input)
P47 (AIN7) to P40 (AIN0)	I/O (Input)	8-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a analog input, the P4CR must be set to "0".	A/D converter analog inputs
P53 (AIN13) to P50 (AIN10)	I/O (Input)	4-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a analog input, the P5CR must be set to "0".	A/D converter analog inputs
P67 (V7) to P60 (V0)	I/O (Output)	Four 8-bit high brackdown voltage output ports with the latch. When used as a VFT driver output, the latch must be cleared to "0".	VFT driver outputs
P77 (V15) to P70 (V8)			
P87 (V23) to P80 (V16)			
P97 (V31) to P90 (V24)			
PD4 (V36) toPD0 (V32)	I/O (Output)	5-bit high breakdown voltage output ports with the latch. When used as a VFT driver output, the latch must be cleared to "0".	

Figure 9-18

Pin Name	Input / Output	Function
XIN, XOUT	Input, Output	Resonator connecting pins for high-frequency clock. For inputting external clock, XIN is used and XOUT is opened.
RESET	I/O	Reset signal input or watchdog timer output/address-trap-reset output/system-clock-reset outputted.
TEST	Input	Test pin for out-going test. Be tied to low.
VDD, VSS	Power Supply	+ 5 V, 0 V (GND)
VKK		VFT driver power supply
VAREF, VASS		Analog reference voltage inputs (High, Low)

Figure 9-19

IC7311 TEA 1507 MOBO Board, Power Supply Control

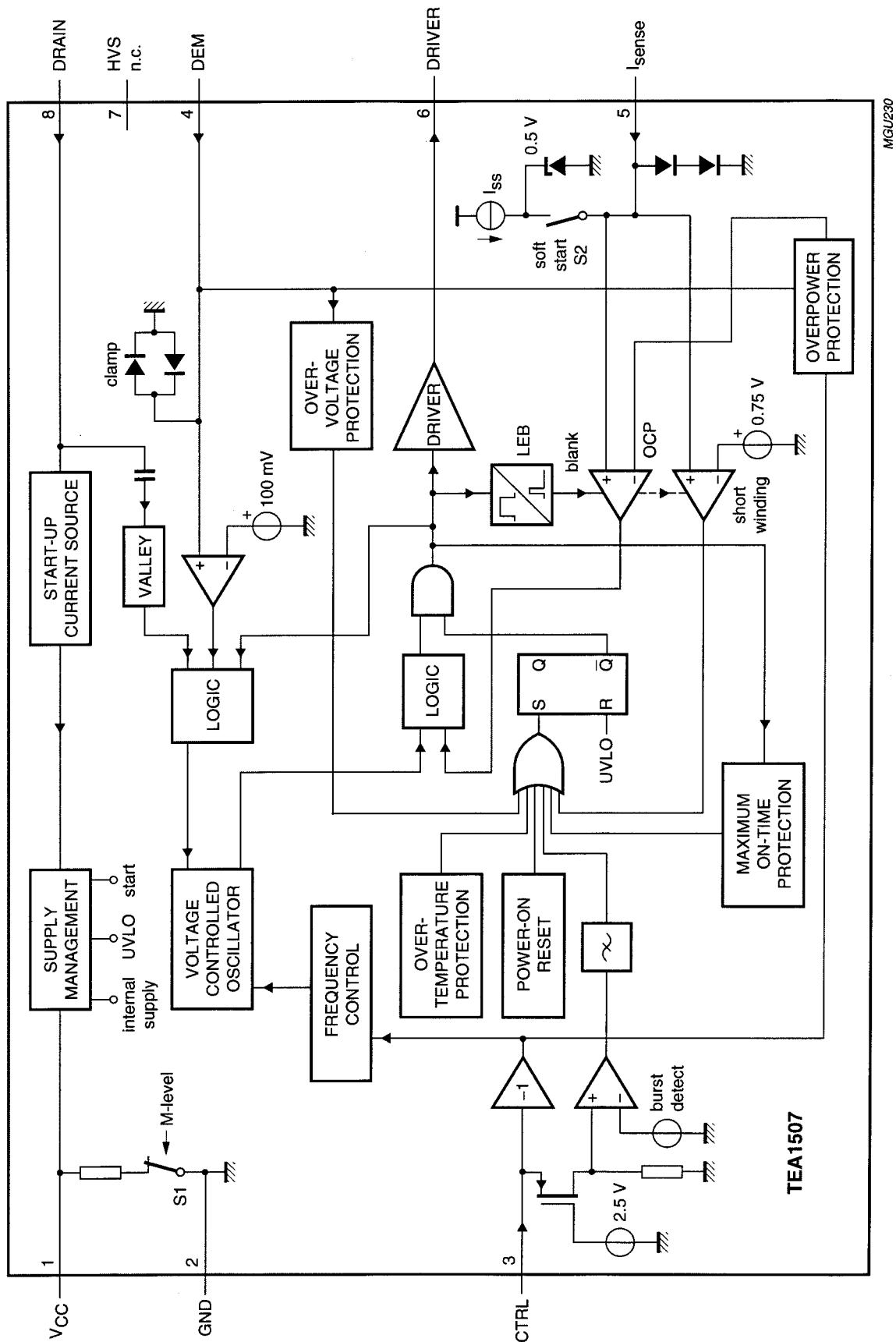
BLOCK DIAGRAM

Fig.2 Block diagram.

Figure 9-20

IC7410: STV6618 MOBO Board, Video Switch Matrix

1.2 Pin Description

Pin No.	Symbol	Description
1	Y/CVBSIN_TUN	Y/CVBS Input from Tuner
2	DIGOUT3	Digital Output Pin 3
3	GND1	Ground Supply 1 for Video Inputs
4	CVBSIN_ENC	CVBS input from Encoder
5	DECV	Video decoupling capacitor
6	CIN_ENC	Chroma Input from Encoder
7	YIN_ENC	Y Input from Encoder
8	V _{CC}	+5 V Power Supply for Video Inputs
9	R/PR/CIN_ENC	Red or Pr or Chroma Input from Encoder
10	G/YIN_ENC	Green or Y Input from Encoder
11	B/PBIN_ENC	Blue or Pb Input from Encoder
12	GND2	Ground Supply 2 for Video Inputs
13	B/PBIN_AUX	Blue or Pb Input from Auxiliary (SCART2 or external Cinch)
14	DIGOUT4	Digital Output Pin 4
15	G/YIN_AUX	Green or Y Input from Auxiliary (SCART2 or external Cinch)
16	DIGOUT5	Digital Output Pin 5
17	R/PR/CIN_AUX	Red or Pr or Chroma input from Auxiliary (SCART2 or external Cinch)
18	DIGOUT6	Digital Output Pin 6
19	Y/CVBSIN_AUX	Y/CVBS Input from Auxiliary (SCART2 or external Cinch)
20	VCCB_REC	Video Output Recorder Buffer Supply Pin
21	Y/CVBSOUT_REC	Y/CVBS Output to Recorder
22	GNDB_REC	Ground Supply for Recorder Buffer
23	COUT_AUX	Chroma Output to Auxiliary (SCART2 or external Cinch)
24	VCCB1	Video Output Buffer Supply Pin
25	Y/CVBSOUT_AUX	Y/CVBS Output to Auxiliary (SCART2 or external Cinch)
26	GNDB	Ground Supply for Video Buffer
27	B/PBOUT_TV	Blue or Pb Output to TV (SCART1 or external Cinch)
28	C_GATE	External Transistor Command for Bidirectional B/C SCART I/O
29	G/YOUT_TV	Green or Y Output to TV (SCART1 or external Cinch)
30	VCCB2	Video Buffer
31	R/PR/COUT_TV	Red or Pr or Chroma Output to TV (SCART1 or external Cinch)
32	VCCB3	Video Output Buffer Supply Pin
33	Y/CVBSOUT_TV	Y/CVBS Output to TV (SCART1 or external Cinch)
34	FBOUT_TV	Fast Blanking Output to TV (SCART1)
35	FBIN_AUX	Fast Blanking Input from Auxiliary (SCART2)

Figure 9-21

Pin No.	Symbol	Description
36	VDD	+5 V Digital Power Supply
37	SCL	I ² C Bus Clock
38	SDA	I ² C Bus Data
39	GNDD	Digital Ground Supply
40	CIN_TV	Chroma Input from TV (SCART1 or external Cinch)
41	Y/CVBSIN_TV	Y/CVBS Input from TV (SCART1 or external Cinch)
42	DIGOUT1	Digital Output Pin 1
43	CIN_TUN	Chroma Input from Tuner
44	DIGOUT2	Digital Output Pin 2

Figure 2: STV6618 Input/Output Diagram

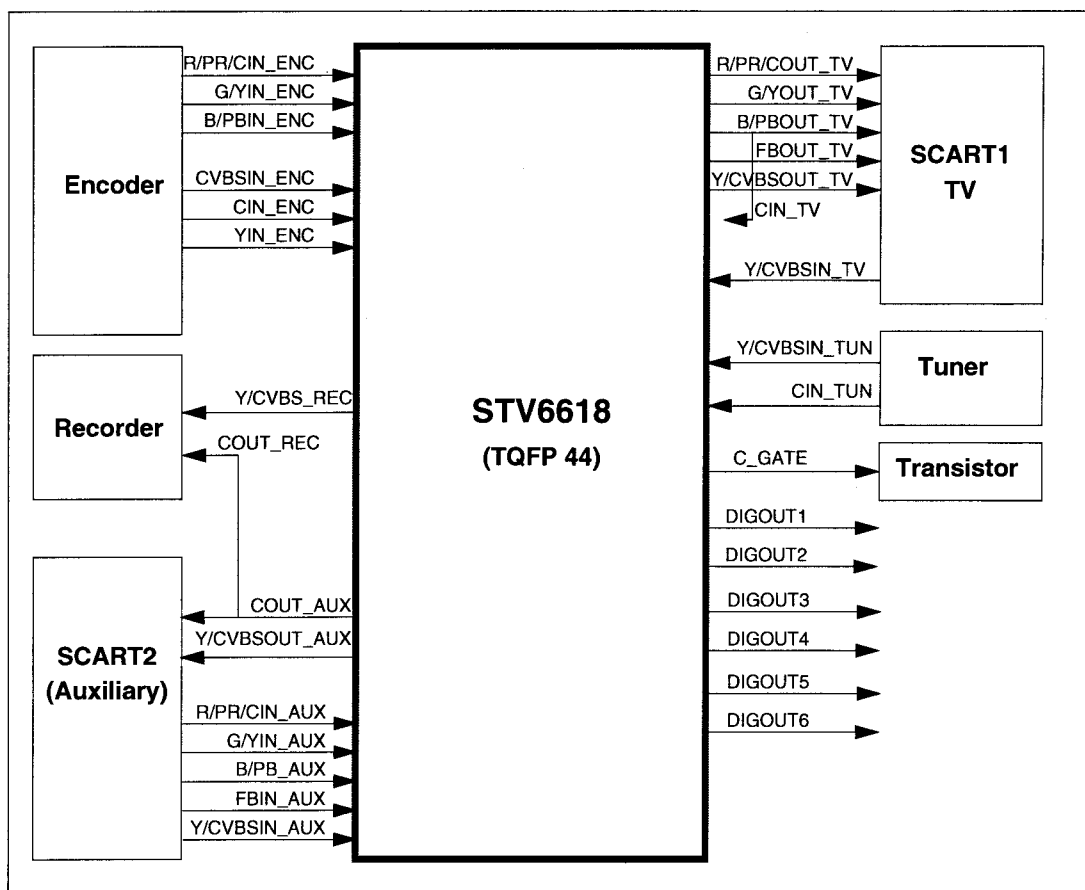


Figure 9-22

Figure 3: STV6618 Block Diagram

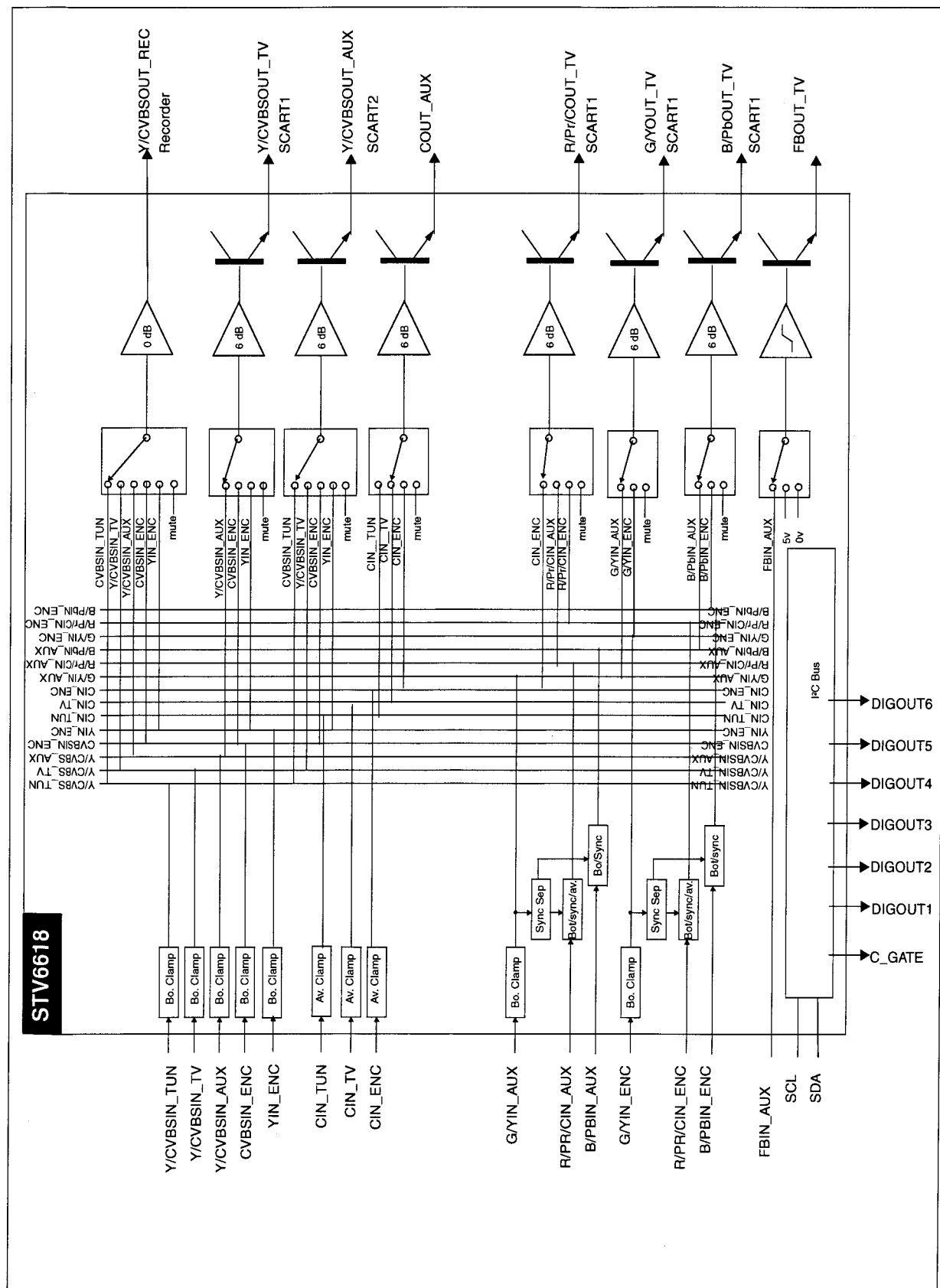


Figure 9-23

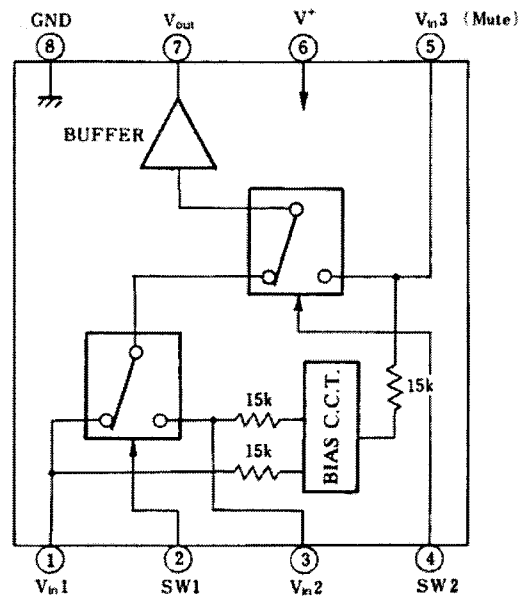
IC7411: NJM2234 MOBO Board, 3-Input Video Switch**■ BLOCK DIAGRAM**

Figure 9-24

INPUT CONTROL SIGNAL – OUTPUT SIGNAL

SW 1	SW 2	OUTPUT SIGNAL
L	L	V _{N1}
H	L	V _{N2}
LH	H	V _{N3}

Figure 9-25

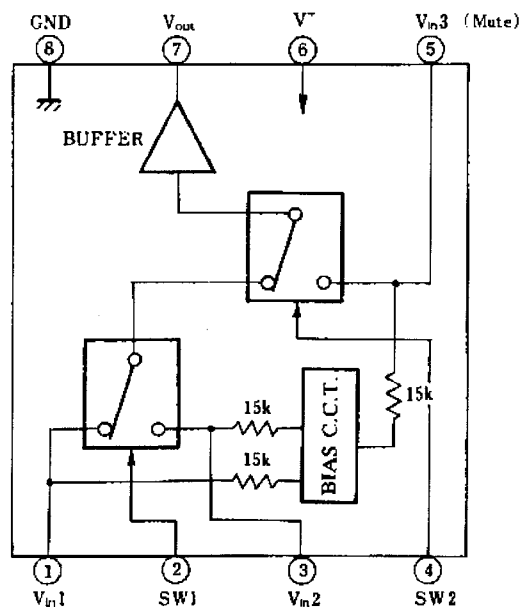
IC7416: NJM2235 MOBO Board, 3-Input Video Switch**BLOCK DIAGRAM**

Figure 9-26

INPUT CONTROL SIGNAL – OUTPUT SIGNAL

SW 1	SW 2	OUTPUT SIGNAL
L	L	V _{IN1}
H	L	V _{IN2}
LH	H	V _{IN3}

Figure 9-27

IC7600: MSP3415G MOBO Board, Multi Sound Processor

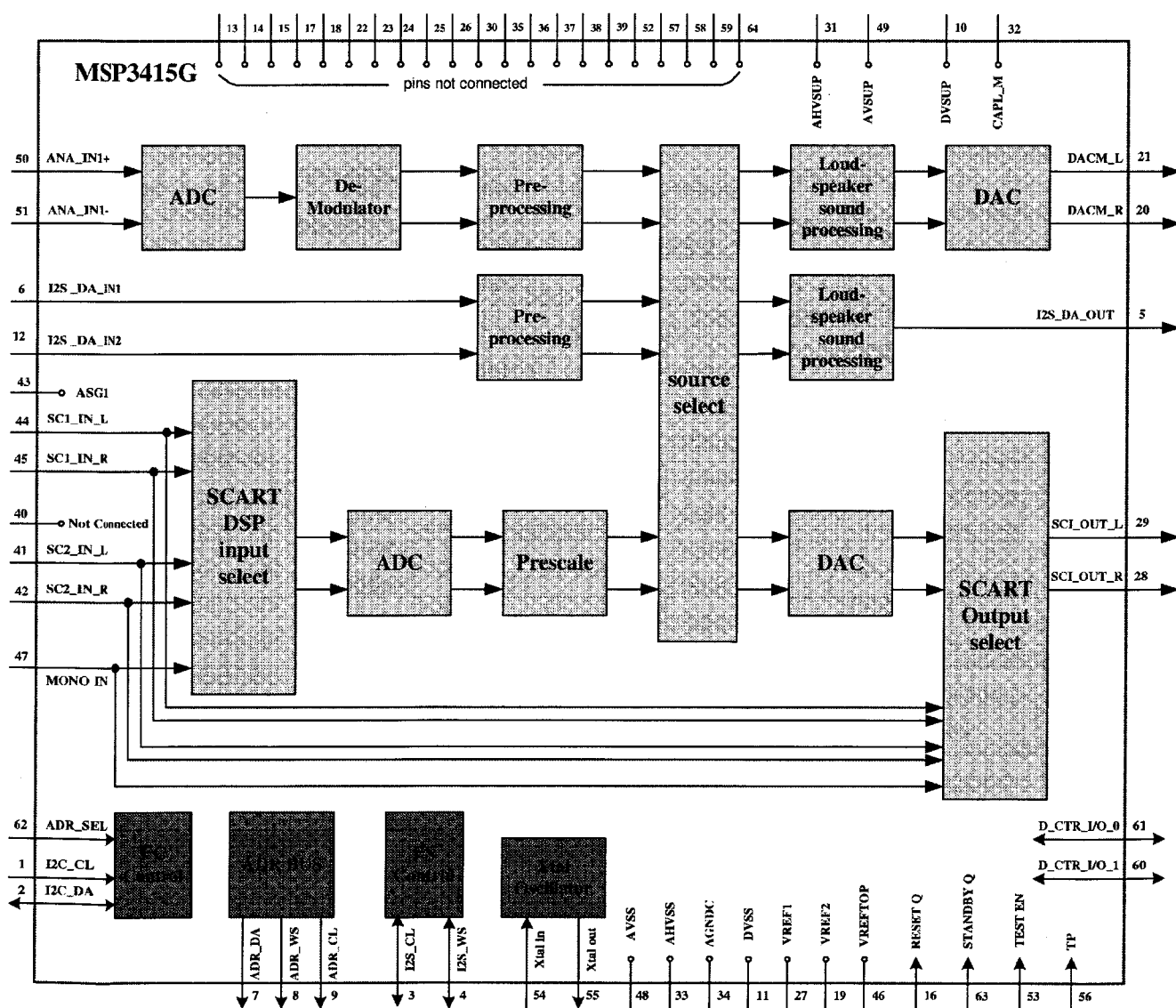


Figure 9-28

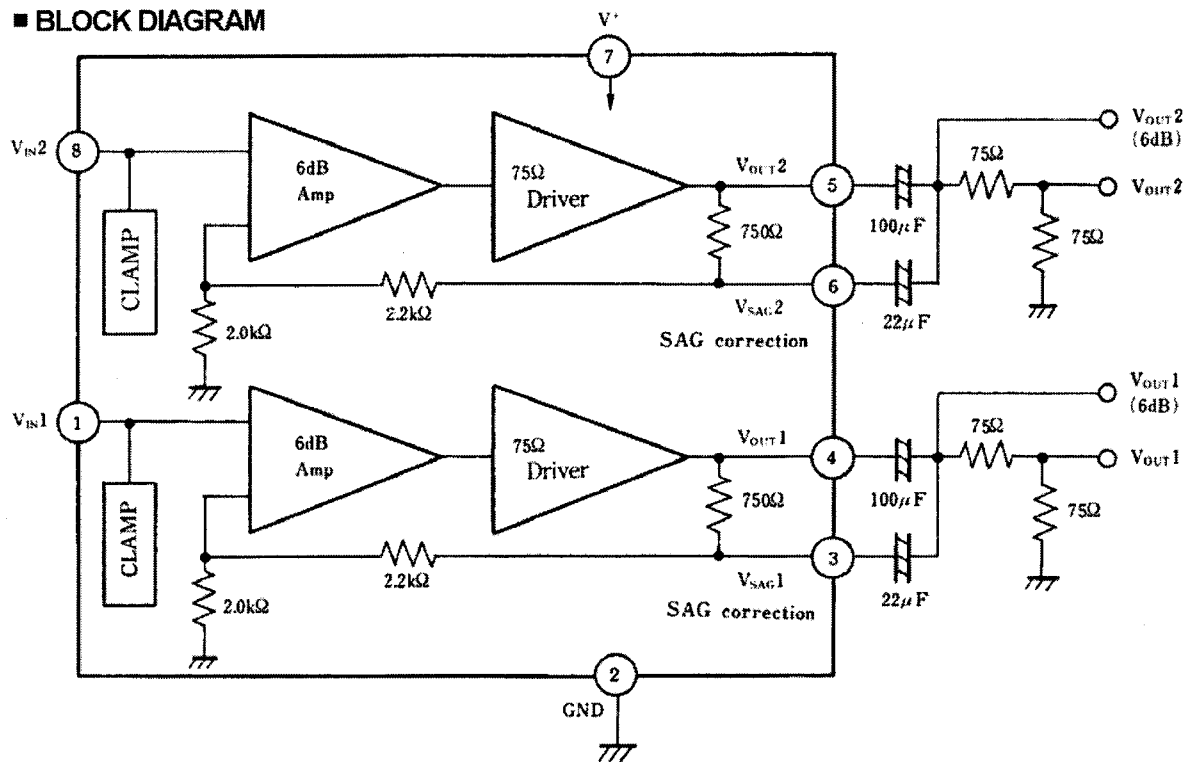
IC7803: NJM2267 MOBO Board, Dual 6dB Video Amplifier**■ BLOCK DIAGRAM**

Figure 9-29

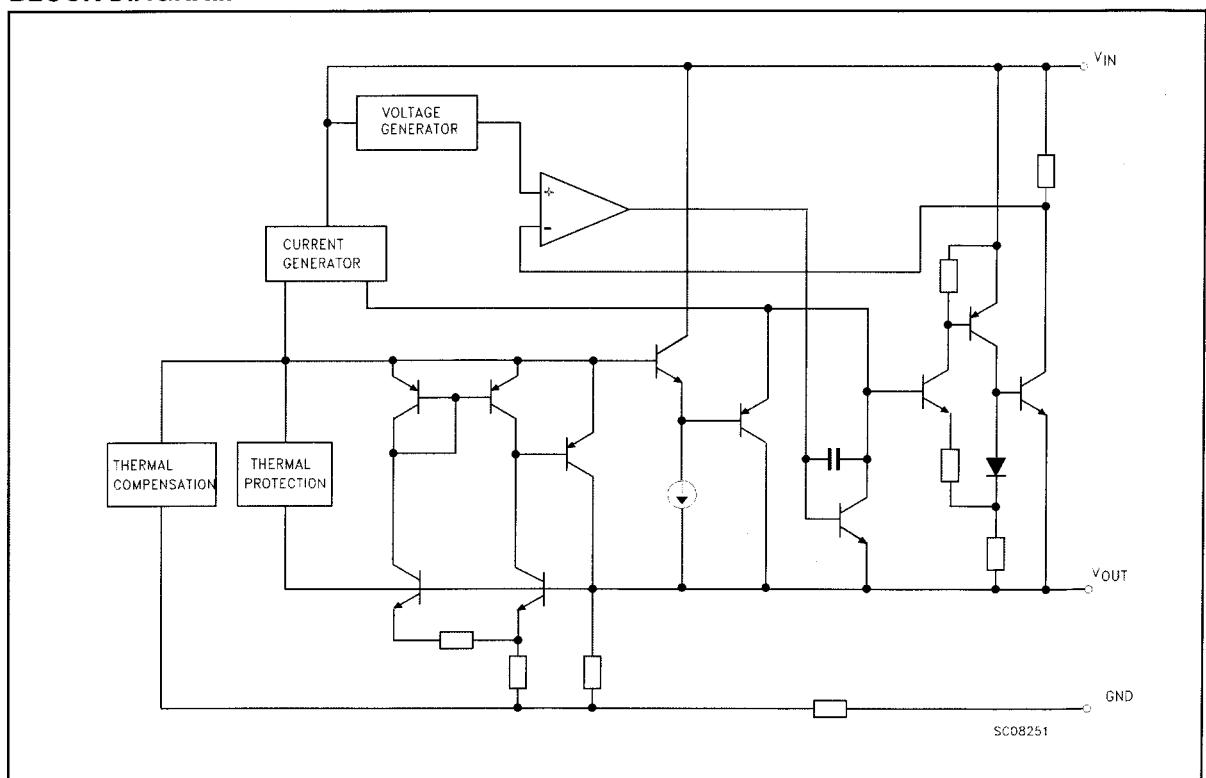
9.4.2 FEBE Board**IC7008 / 7603 / 7607 / 7608, LD1117 FEBE Board, Voltage Regulator****BLOCK DIAGRAM**

Figure 9-30

IC7201, TZA1047: FEBE Baord, Analogue Processor

Block diagram

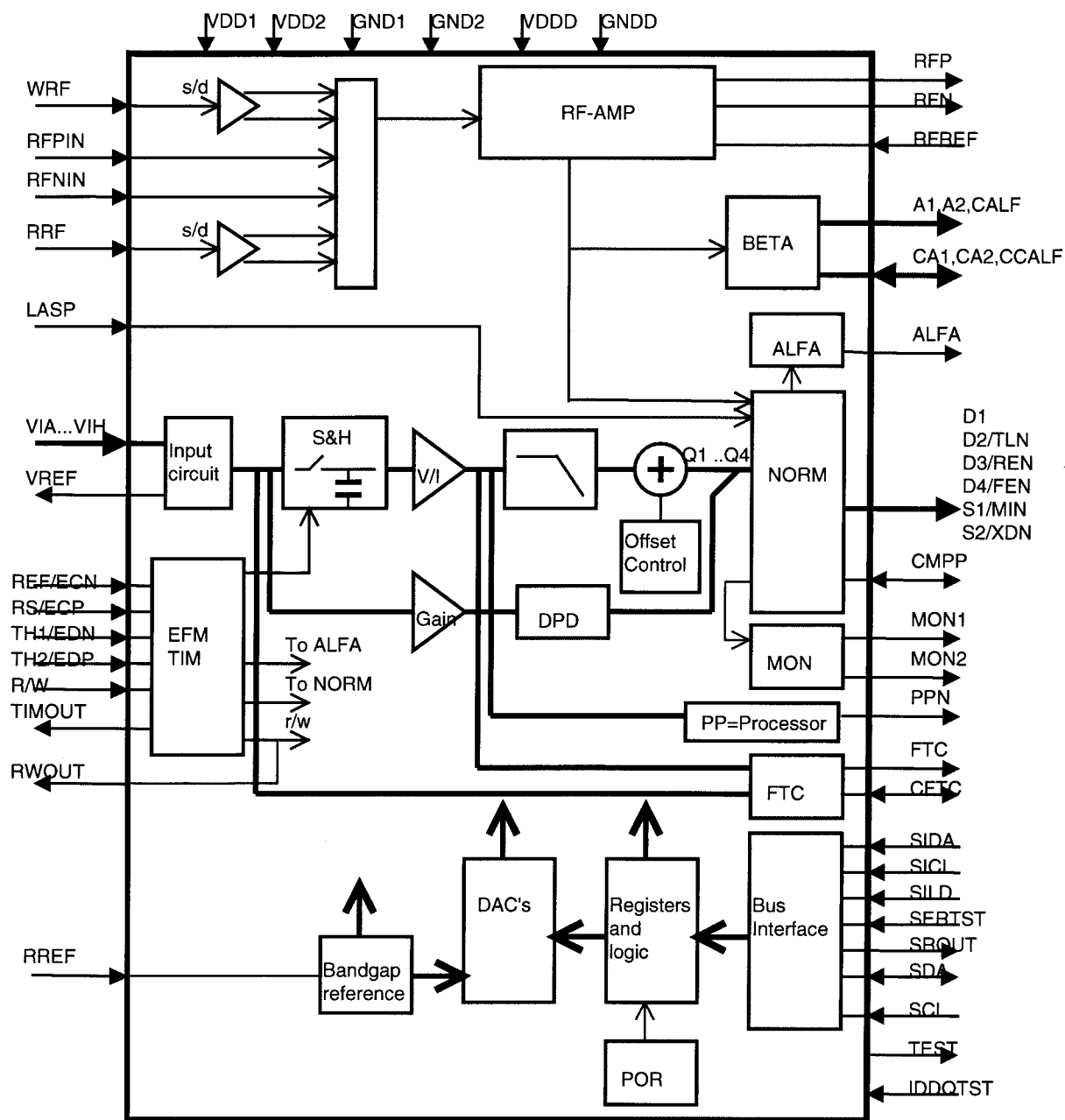


Fig 1. TZA1047 Block Diagram

Figure 9-31

Pin description

Table 1: Pin description

Symbol	Pin	Description
VIH	1	Satellite segment H input
GND1	2	Ground
VIC	3	Central segment C input
VIB	4	Central segment B input
GND1	5	Ground
RFNIN	6	Inverse differential RF input / Single-ended RF read input
RFPIN	7	Differential RF input/ Single-ended RF write input
VDD1	8	Positive supply
VID	9	Central segment D input
VIA	10	Central segment A input
VDD1	11	Positive supply
VIE	12	Satellite segment E input
VIG	13	Satellite segment G input
RWOUT	14	R/W signal output
SDA	15	Data input/output I ² C
SCL	16	Clock input I ² C
SILD	17	Strobe line of serial bus interface
SIDA	18	Data line of serial bus interface
SICL	19	Clock line of serial bus interface
TIMOUT	20	EFMTIM test output
R/W	21	External Read/Write signal input
VDDD	22	Positive supply digital part
VSSD	23	digital ground
REF/ECN	24	Reference input for timing signals in EFMTIM bypass mode ^[1] / Inverse EFM clock input ^[2]
RS/ECP	25	RF sampling signal ^[1] / EFM clock input ^[2]
TH1/EDN	26	Segment sampling timing signal ^[1] / Inverse EFM data input ^[2]
TH2/EDP	27	Segment sampling timing signal ^[1] / EFM data input ^[2]
SERTST	28	Enable test mode (Tie to GND or leave open for normal operation)
VDD2	29	Positive supply voltage

Figure 9-32

Table 1: Pin description (Continued)

Symbol	Pin	Description
GND2	30	Supply ground
RFP	31	RF output voltage, positive
RFN	32	RF output voltage, negative
RFREF	33	Reference voltage for differential RF output common mode level
PPN	34	Output PP voltage
CFTC	35	FTC high pass filter capacitor
FTC	36	FTC output
GND1	37	Supply ground
CA1	38	Beta circuit external capacitor
CA2	39	Beta circuit external capacitor
CCALF	40	Beta circuit external capacitor
RREF	41	Reference resistor to ground
GND1	42	Supply ground
CMPP	43	MPP external capacitor
VDD1	44	Positive supply
MON1	45	Monitor output voltage
MON2	46	Monitor output voltage
S2/XDN	47	Servo output current
S1/MIRN	48	Servo output current
D4/FEN	49	Servo output current
D3/REN	50	Servo output current
D2/TLN	51	Servo output current
D1	52	Servo output current
IDDQTST	53	Select zero dissipation mode (tie to GND for normal operation)
CALF	54	RF average level signal
A2	55	RF bottom level signal
A1	56	RF top level signal
SROUT	57	shift register output for register test mode
ALFA	58	alfa output current
LASP	59	laser power setpoint signal
TEST	60	Test output
RRF	61	Single ended RF read input voltage

Figure 9-33

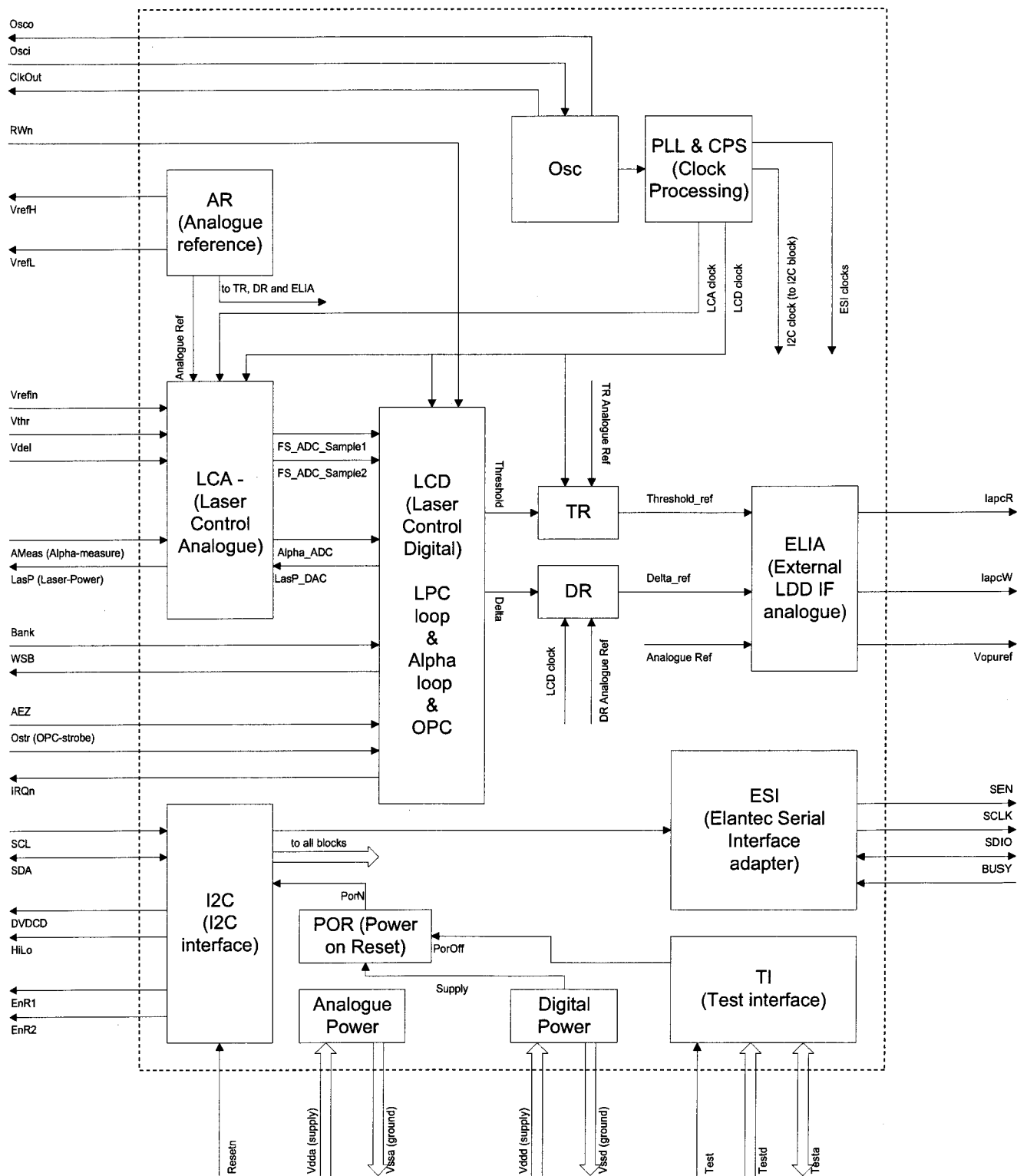
Table 1: Pin description (Continued)

Symbol	Pin	Description
WR F	62	Single ended RF write input voltage
VR E F	63	PDIC reference voltage output
VIF	64	Satellite segment F input

[1] Only in EFM bypass mode

[2] EFM clock and data when not in EFM bypass mode.

Figure 9-34

IC7300, TZA1042: FEBE Baord, Laser Power Controller**Figure 9-35**

Pin description

Symbol	Pin	Type	Drive	Description /Thr.
AEZ	1	I hy pd	T	Alpha Error Zero/Alpha Set Zero
V _{DDD3}	2	P	-	Digital Pad Supply
V _{SSD3}	3	P	-	Digital Pad Supply
CLOCKOUT	4	T	M	Buffered Oscillator Output
OSCO	5	AO	A	Output of inverting Amplifier that forms oscillator
OSCI	6	AI	A	Input of inverting Amplifier that forms oscillator
TEST1D	7	I pd	T	Test pin
AMEAS	8	AI	A	Alpha Measure – value of measured disk writing quality
V _{DDA1}	9	P	-	Analogue Supply
V _{SSA1}	10	P	-	Analogue Supply
LASP	11	AO	A	Laser Power – indicates power level
VREFL	12	AO	A	Bandgap Voltage Reference ground connection
VREFH	13	AO	A	Bandgap Voltage Reference output
VDEL	14	AI	A	Voltage input for Delta “laser power”
VTHR	15	AI	A	Voltage input for Threshold “laser power”
VOPUREF	16	AO	A	Reference Voltage for OPU
VREFIN	17	AI	A	Input Reference Voltage for Vthr and Vdel
V _{DDA2}	18	P	-	Analogue Supply
V _{SSA2}	19	P	-	Analogue Supply
TEST1A	20	AB	A	Test pin
IAPCW	21	AO	A	Current Output of Delta Reference
IAPCR	22	AO	A	Current Output of Threshold Reference
TEST2A	23	AB	A	Test pin
ENR2	24	T	M	Programmable Output Flag
ENR1	25	B pd	M/T	Device Initialisation/Programmable Output Flag (must be driven to VDD during reset)
DVDCD	26	T	M	Programmable Output Flag for indicating DVD/CD mode

Figure 9-36

Pin description...continued

Symbol	Pin	Type	Drive /Thr.	Description
IRQN	35	OD	M	Interrupt Request Not – active low interrupt request
OSTR	36	I hy pd	T	OPC Strobe – request step in alpha setpoint / Board test input
RESETN	37	I hy pd	T	Reset Not – active low reset input
RWN	38	B	M/T	Read/Write not – indicates power setpoints/Board test IO
V _{SSD2}	39	P	-	Digital Core Supply
V _{DDD2}	40	P	-	Digital Core Supply
BANK	41	I hy pd	T	CAV setpoint switching input signal / Board test IO
TEST2D	42	I pd	T	Test pin
SDA	43	BOD	M/T	I ² C Serial Data
SCL	44	I	T	I ² C Serial Clock

[1] All supply pins must be connected to the same external power supply voltage

[2] All inputs are 5V tolerant – i.e. they will drive the supply voltage (3.0-3.6V), but will work correctly when interface to a 5V drive device

[3] The pin type definition is given below:

PinType Definition Table

Type	Definition
I	input
O	output
OD	open drain
B	bi-directional
BOD	bi-directional open drain
T	tri-state output
AI	analog input
AO	analog output
AB	analog bi-directional
P	power connection
hy	hysteresis on input
pd	hysteresis on output

Figure 9-37

IC7402, SA56202 FEBE Board, Motor Drivers

PIN CONFIGURATION

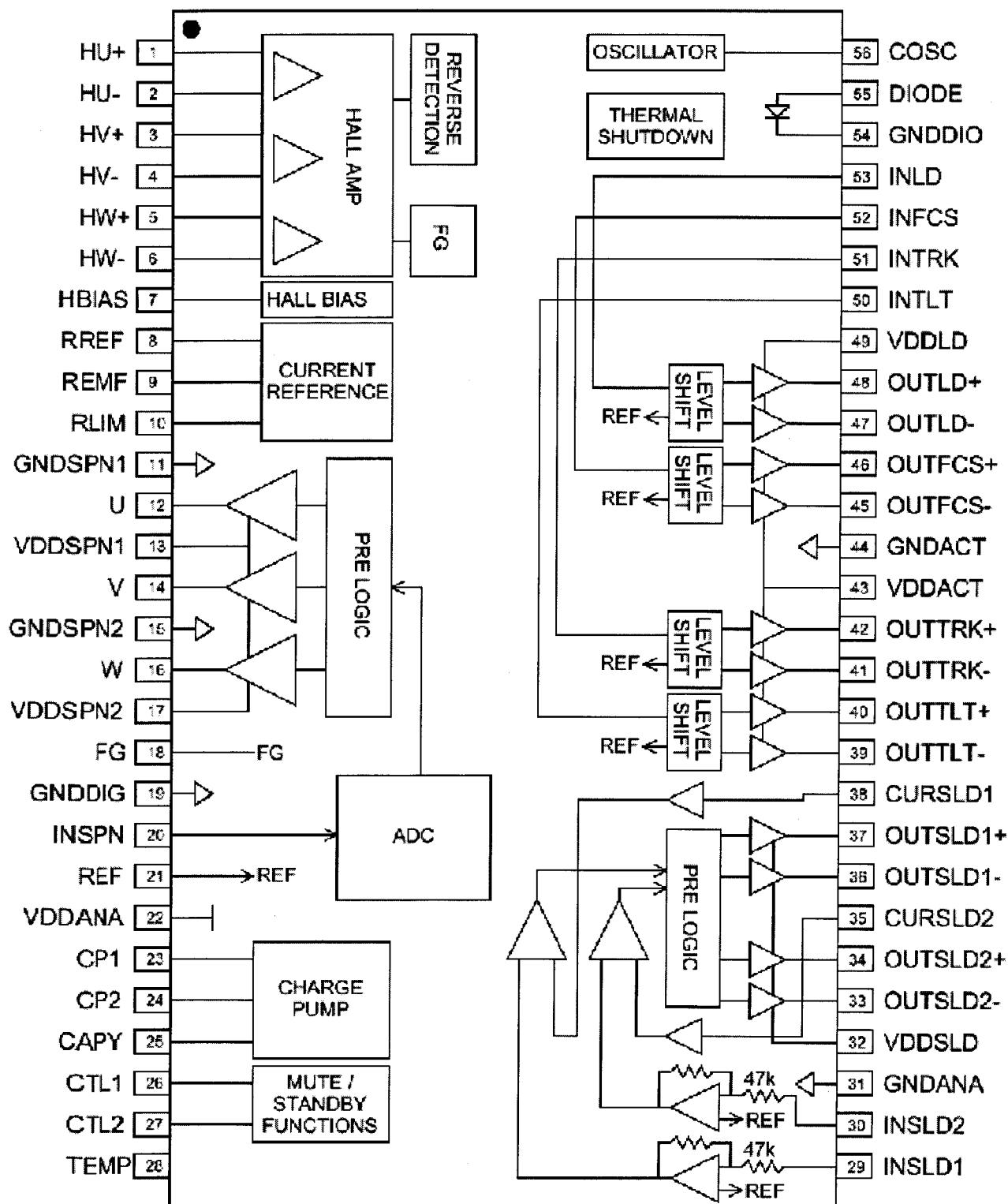


Fig.2 Block diagram SA56202.

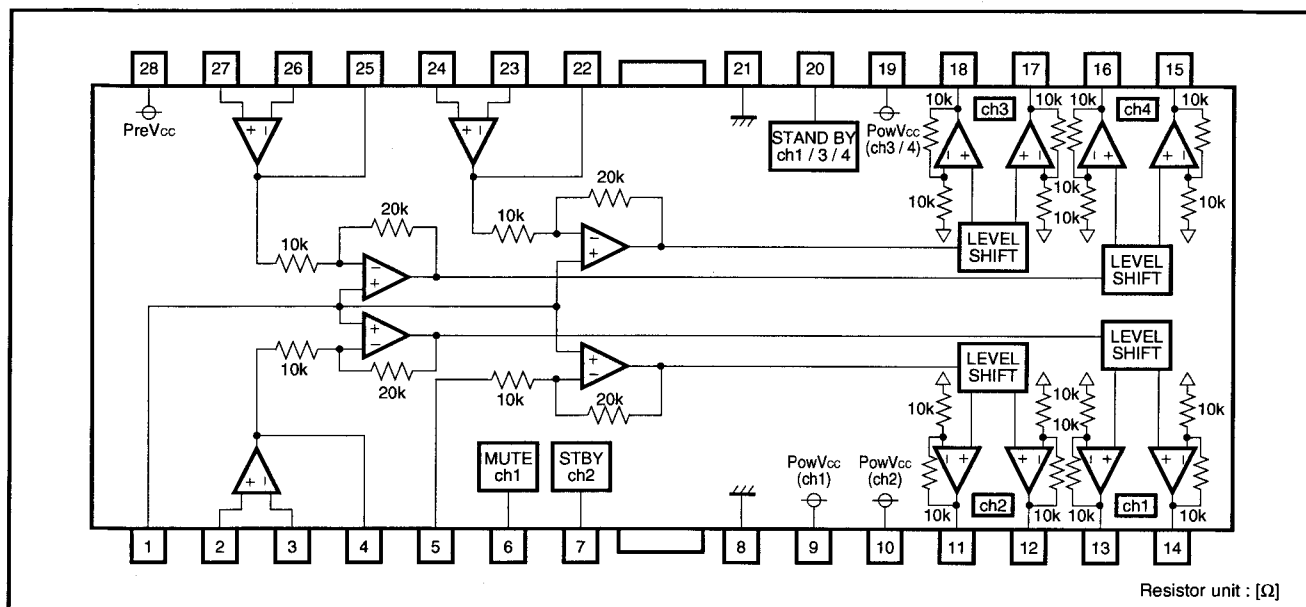
PIN DESCRIPTION

PIN	SYMBOL	DESCRIPTION	PIN	SYMBOL	DESCRIPTION
1	HU+	positive Hall input U	56	COSC	ext. capacitor for int. oscillator
2	HU-	negative Hall input U	55	DIODE	diode for temperature readout
3	HV+	positive Hall input V	54	GNDDIO	temperature diode ground
4	HV-	negative Hall input V	53	INLD	loading driver input
5	HW+	positive Hall input W	52	INFCS	focus driver input
6	HW-	negative Hall input W	51	INTRK	tracking driver input
7	HBIAS	Hall element bias	50	INTLT	tilting driver input
8	RREF	ext. res. for current reference	49	VDDL	loading driver power supply
9	REMF	ext. res. for EMF regeneration	48	OUTLD+	loading driver positive output
10	RLIM	ext. res. for current limit	47	OUTLD-	loading driver negative output
11	GNDSN1	spindle driver power ground 1	46	OUTFCS+	focus driver positive output
12	U	spindle driver output U	45	OUTFCS-	focus driver negative output
13	VDDSN1	spindle driver power supply 1	44	GNDACT	actuator drivers power ground
14	V	spindle driver output V	43	VDDACT	actuator drivers power supply
15	GNDSN2	spindle driver power ground 2	42	OUTTRK+	tracking driver pos. output
16	W	spindle driver output W	41	OUTTRK-	tracking driver neg. output
17	VDDSN2	spindle driver power supply 2	40	OUTTTL+	tilting driver pos. output
18	FG	frequency generator output	39	OUTTTL-	tilting driver neg. output
19	GNDDIG	ground supply	38	CURSLD1	sled driver 1 current sense
20	INSPN	spindle driver input	37	OUTSLD1+	sled driver 1 positive output
21	REF	reference input voltage	36	OUTSLD1-	sled driver 1 negative output
22	VDDANA	system supply voltage	35	CURSLD2	sled driver 2 current sense
23	CP1	charge pump cap. conn. 1	34	OUTSLD2+	sled driver 2 positive output
24	CP2	charge pump cap. conn. 2	33	OUTSLD2-	sled driver 2 negative output
25	CAPY	charge pump output voltage	32	VDDSLD	sled driver power supply
26	CTL1	driver logic control input 1	31	GNDANA	ground supply
27	CTL2	driver logic control input 2	30	INSLD2	sled driver 2 input
28	TEMP	thermal warning	29	INSLD1	sled driver 1 input

Figure 9-39

IC7409 BA5995: FEBE Board, 4-channel BTL driver

●Block diagram



●Pin descriptions

Pin No.	Pin name	Function
1	BIAS IN	Input for bias-amplifier
2	OPIN1 (+)	Non inverting input for CH1 OP-AMP
3	OPIN1 (-)	Inverting input for CH1 OP-AMP
4	OPOUT1	Output for CH1 OP-AMP
5	IN2	Input for CH2
6	MUTE	Input for CH1 mute control
7	STBY2	Input for CH2 stand by control
8	GND	Substrate ground
9	PowVcc1	Vcc for CH1 power block
10	PowVcc2	Vcc for CH2 power block
11	Vo2 (-)	Inverted output of CH2
12	Vo2 (+)	Non inverted output of CH2
13	Vo1 (-)	Inverted output of CH1
14	Vo1 (+)	Non inverted output of CH1

Pin No.	Pin name	Function
15	Vo4 (+)	Non inverted output of CH4
16	Vo4 (-)	Inverted output of CH4
17	Vo3 (+)	Non inverted output of CH3
18	Vo3 (-)	Inverted output of CH3
19	PowVcc3	Vcc for CH3/4 power block
20	STBY1	Input for CH1/3/4 stand by control
21	GND	Substrate ground
22	OPOUT3	Output for CH3 OP-AMP
23	OPIN3 (-)	Inverting input for CH3 OP-AMP
24	OPIN3 (+)	Non inverting input for CH3 OP-AMP
25	OPOUT4	Output for CH4 OP-AMP
26	OPIN4 (-)	Inverting input for CH4 OP-AMP
27	OPIN4 (+)	Non inverting input for CH4 OP-AMP
28	PreVcc	Vcc for pre block

Note) Symbol of + and - (output of drivers) means polarity to input pin.
(For example if voltage of pin4 high, pin14 is high.)

Figure 9-40

IC7500, PNX7850: FEBE Board, Channel Codec/Buffer Manager/Servo Processor and Controller

Nexperia PNX7850 conceptual block diagram

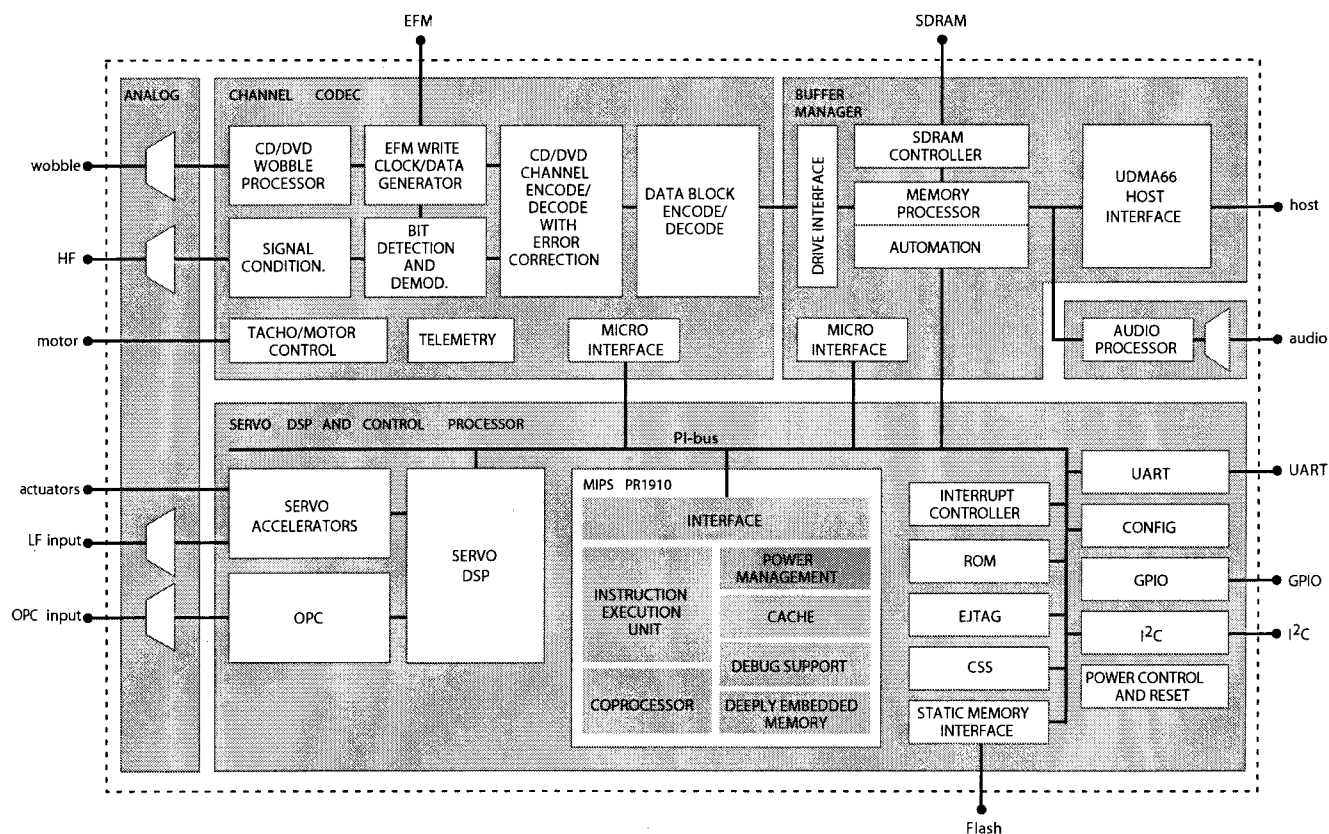


Figure 9-41

IC7926 NCP303LSN, FEBE Board, Reset Circuit

NCP303LSNxxT1

Open Drain Output Configuration

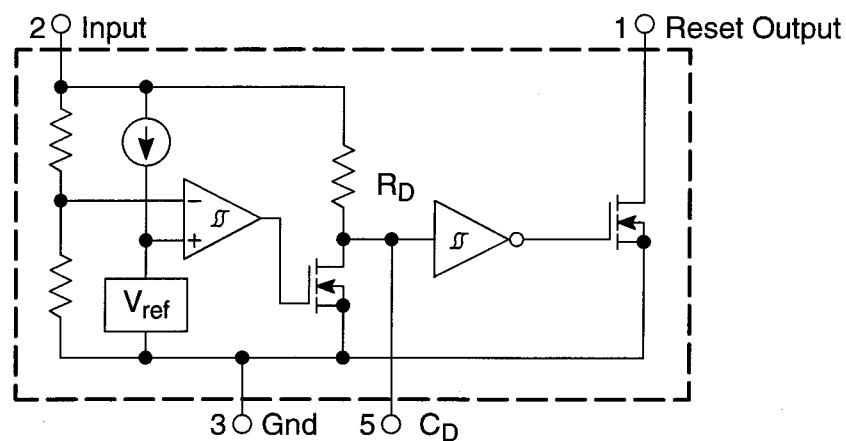


Figure 9-42

IC7929 NCP1570D, FEBE Board, DC/DC Converter Control

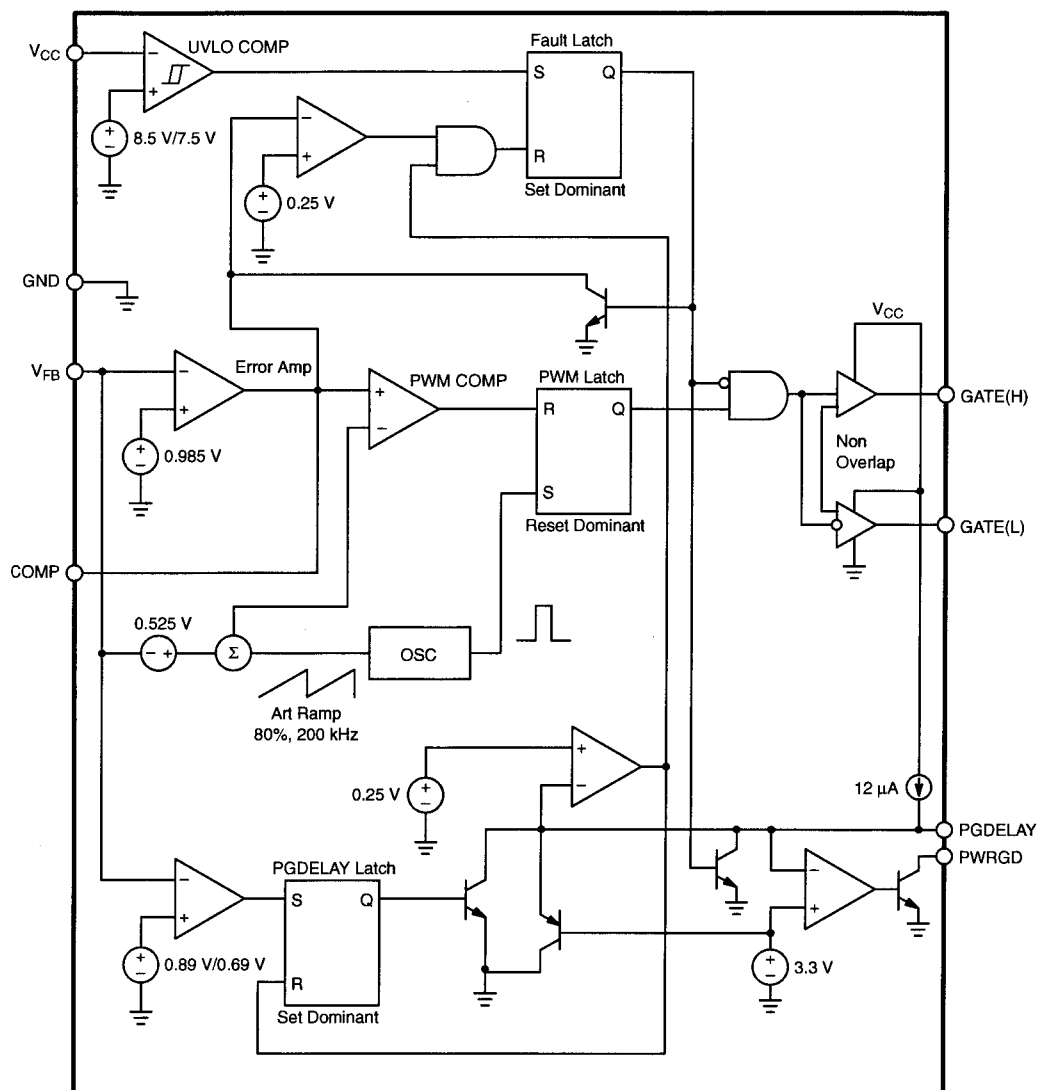


Figure 9-43

PACKAGE PIN DESCRIPTION

PACKAGE PIN #	PIN SYMBOL	FUNCTION
SO-8		
1	V _{CC}	Power supply input.
2	PWRGD	Open collector output goes low when V _{FB} is out of regulation. User must externally limit current into this pin to less than 20 mA.
3	PGDELAY	External capacitor programs PWRGD low-to-high transition delay.
4	COMP	Error amp output. PWM comparator reference input. A capacitor to LGND provides error amp compensation and Soft Start. Pulling pin < 0.45 locks gate outputs to a zero percent duty cycle state.
5	GATE(H)	High-side switch FET driver pin. Capable of delivering peak currents of 1.5 A.
6	GATE(L)	Low-side synchronous FET driver pin. Capable of delivering peak currents of 1.5 A.
7	V _{FB}	Error amplifier and PWM comparator input.
8	GND	Power supply return.

Figure 9-44

IC 7009 SAA7117AE/V2, LECO Board, Multistandard video
decoder with adaptive comb filter and component video
input

4 PINNING

SYMBOL	PIN		TYPE ⁽¹⁾	DESCRIPTION
	QFP160	BGA156		
DNC6	1	B2	I	do not connect, reserved for future extensions and for testing
AI41	2	B1	I	analog input 41 (either video or D1/SCART sensor) (7117A only)
AGND	3	C2	P	analog signal ground
V _{SSA4}	4	C1	P	ground for analog inputs AI4x
AI42	5	D2	I	analog input 42 (either video, D1/SCART sensor) (7117A only)
AI4D	6	D3	I	differential input for ADC channel 4 (pins AI41 to AI44)
AI43	7	D1	I	analog input 43 (either video or D1/SCART sensor) (7117A only)
V _{DDA4}	8	D4	P	analog supply voltage for analog inputs AI4x (3.3 V)
V _{DDA4A}	9	E2	P	analog supply voltage for analog inputs AI4x (3.3 V)
AI44	10	E1	I	analog input 44 (either video, D1/SCART sensor)
AI31	11	E3	I	analog input 31 (either video or D1/SCART sensor) (7117A only)
V _{SSA3}	12	E4	P	ground for analog inputs AI3x
AI32	13	F2	I	analog input 32 (either video, D1/SCART sensor) (7117A only)
AI3D	14	F1	I	differential input for ADC channel 3 (pins AI31 to AI34)
AI33	15	F3	I	analog input 33 (either video or D1/SCART sensor) (7117A only)
V _{DDA3}	16	F4	P	analog supply voltage for analog inputs AI3x (3.3 V)
V _{DDA3A}	17	G2	P	analog supply voltage for analog inputs AI3x (3.3 V)
AI34	18	G1	I	analog input 34 (either video or D1/SCART sensor) (7117A only)
AI21	19	G4	I	analog input 21 (7117A only)
V _{SSA2}	20	H3	P	ground for analog inputs AI2x
AI22	21	G3	I	analog input 22;
AI2D	22	H1	I	differential input for ADC channel 2 (pins AI24 to AI21)
AI23	23	H2	I	analog input 23 (7117A only)
V _{DDA2}	24	H4	P	analog supply voltage for analog inputs AI2x (3.3 V)
V _{DDA2A}	25	J1	P	analog supply voltage for analog inputs AI2x (3.3 V)
AI24	26	J3	I	analog input 24
AI11	27	J2	I	analog input 11
V _{SSA1}	28	J4	P	ground for analog inputs AI1x

SYMBOL	PIN		TYPE ⁽¹⁾	DESCRIPTION
	QFP160	BGA156		
AI12	29	K1	I	analog input 12
AI1D	30	K3	I	differential input for ADC channel 1 (pins AI14 to AI11)
AI13	31	K2	I	analog input 13
V _{DDA1}	32	K4	P	analog supply voltage for analog inputs AI1x (3.3 V)
V _{DDA1A}	33	L1	P	analog supply voltage for analog inputs AI1x (3.3 V)
AI14	34	L3	I	analog input 14
AGNDA	35	L2	P	analog signal ground
DNC	36	M1	NC	do not connect, reserved for future extensions and for testing
V _{DDA0}	37	M3	P	analog supply voltage (3.3 V)
V _{SSA0}	38	M2	P	analog ground
AOUT	39	N1	O	analog output (7117A only)
V _{DDA_C18}	40	N2	P	analog supply voltage (1.8 V)
V _{DDA_A18}	41	P2	P	analog supply voltage (1.8 V)
DNC15	42	N3	I	do not connect, reserved for future extensions and for testing
GPIN	43	P3	I/pu	general purpose input (with internal pull-up)
CE	44	N4	I/pu	chip enable or reset input (with internal pull-up)
V _{DDD1}	45	M4	P	digital supply voltage 1 (peripheral cells, 3.3 V)
LLC	46	P4	O	line-locked system clock output (27 MHz nominal)
V _{SSD1}	47	L4	P	digital ground 1 (peripheral cells)
LLC2_54	48	N5	O	line-locked 1/2 clock output (13.5 MHz nominal), or adc_clock 54 MHz, selectable via I ² C
RES	49	P5	O	reset output (active LOW)
V _{DDD2}	50	M5	P	digital supply voltage 2 (core, 1.8 V)
V _{SSD2}	51	L5	P	digital ground 2
DNC23	52	N6	I	do not connect, reserved for future extensions and for testing
DNC24	53	P6	O	do not connect, reserved for future extensions and for testing
DNC25	54	M6	O	do not connect, reserved for future extensions and for testing
DNC26	55	L6	O	do not connect, reserved for future extensions and for testing
DNC27	56	N7	O	do not connect, reserved for future extensions and for testing
DNC28	57	P7	O	do not connect, reserved for future extensions and for testing
DNC29	58	L7	O	do not connect, reserved for future extensions and for testing
V _{DDD3}	59	M8	P	digital supply voltage 3 (peripheral cells, 3.3 V)
DNC30	60	M7	O	do not connect, reserved for future extensions and for testing
DNC31	61	P8	O	do not connect, reserved for future extensions and for testing
DNC32	62	N8	O	do not connect, reserved for future extensions and for testing
V _{SSD3}	63	L8	P	digital ground 3 (peripheral cells)
INT_A	64	P9	O/od	I ² C-bus interrupt flag (LOW if any enabled status bit has changed)
V _{DDD4}	65	M9	P	digital supply voltage 4 (core, 1.8 V)
SCL	66	N9	I	serial clock input (I ² C-bus)
V _{SSD4}	67	L9	P	digital ground 4 (core; connects to substrate)

SYMBOL	PIN		TYPE ⁽¹⁾	DESCRIPTION
	QFP160	BGA156		
SDA	68	P10	I/O/od	serial data input/output (I ² C-bus)
RTS0	69	M10	O	real-time status or sync information, controlled by subaddresses 11h and 12h
RTS1	70	N10	O	real-time status or sync information, controlled by subaddresses 11h and 12h
RTCO	71	L10	O/st/pd	real-time control output; contains information about actual system clock frequency, field rate, odd/even sequence, decoder status, subcarrier frequency and phase and PAL sequence (see "RTC Functional Description"); notes 5 and 6
AMCLK	72	P11	O	audio master clock output
V _{DD5}	73	M11	P	digital supply voltage 5 (peripheral cells, 3.3 V)
ASCLK	74	N11	O	audio serial clock output
ALRCLK	75	P12	O/st/pd	audio left/right clock output; notes 5 and 7
AMXCLK	76	M12	I	audio master external clock input
ITRDY	77	N12	I/pu	target ready input for image port data
DNC0	78	P13	NC	do not connect, reserved for future extensions and for testing
DNC16	79	N13	I/O	do not connect, reserved for future extensions and for testing
DNC17	80	N14	NC	do not connect, reserved for future extensions and for testing
DNC19	81	–	NC	do not connect, reserved for future extensions and for testing
DNC20	82	–	NC	do not connect, reserved for future extensions and for testing
FSW	83	M13	I/pd	Legacy fast switch function of SAA7118 (with internal pull-down)
ICLK	84	M14	I/O	clock output signal for image port, or optional asynchronous back-end clock input
IDQ	85	L13	O	output data qualifier for image port (optional: gated clock output)
ITRI	86	L12	I	image port output control signal, affects all input port pins inclusive ICLK, enable and active polarity is under software control
IGP0	87	L14	O	general purpose output signal 0 of image port
V _{SS5}	88	L11	P	digital ground 5 (peripheral cells)
IGP1	89	K13	O	general purpose output signal 1 of image port
IGPV	90	K14	O	multi purpose vertical reference output signal of image port
IGPH	91	K12	O	multi purpose horizontal reference output signal of image port
IPD7	92	K11	O	MSB0 of image port data 1 output
IPD6	93	J13	O	MSB1 of image port data 1 output
IPD5	94	J14	O	MSB2 of image port data 1 output
V _{DD6}	95	J12	P	digital supply voltage 6 (peripheral cells, 3.3 V)
V _{SS6}	96	J11	P	digital ground 6 (core; connects to substrate)
IPD4	97	H13	O	MSB3 of image port data 1 output
IPD3	98	H14	O	MSB4 of image port data 1 output
IPD2	99	H11	O	MSB5 of image port data 1 output
IPD1	100	G12	O	MSB6 of image port data 1 output

SYMBOL	PIN		TYPE ⁽¹⁾	DESCRIPTION
	QFP160	BGA156		
V _{DDD7}	101	H12	P	digital supply voltage 7 (core, 1.8 V)
IPD0	102	G14	O	LSB of image port data 1 output
HPD7	103	G13	I/O	MSB0 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
V _{SSD7}	104	G11	P	digital ground 7 (peripheral cells)
HPD6	105	F14	I/O	MSB1 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
V _{DDD8}	106	F12	P	digital supply voltage 8 (core, 1.8 V)
HPD5	107	F13	I/O	MSB2 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
V _{SSD8}	108	F11	P	digital ground 8 (core)
HPD4	109	E14	I/O	MSB3 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
HPD3	110	E12	I/O	MSB4 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
HPD2	111	E13	I/O	MSB5 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
HPD1	112	E11	I/O	MSB6 of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
HPD0	113	D14	I/O	LSB of host port data I/O, extended C _B -C _R input for expansion port, extended C _B -C _R output for image port
V _{DDD9}	114	D12	P	digital supply voltage 9 (peripheral cells, 3.3 V)
DNC1	115	D13	NC	do not connect, reserved for future extensions and for testing
DNC2	116	C14	NC	do not connect, reserved for future extensions and for testing
DNC7	117	C12	NC	do not connect, reserved for future extensions and for testing
DNC8	118	C13	NC	do not connect, reserved for future extensions and for testing
DNC11	119	B14	NC	do not connect, reserved for future extensions and for testing
DNC12	120	B13	NC	do not connect, reserved for future extensions and for testing
DNC21	121	–	NC	do not connect, reserved for future extensions and for testing
DNC22	122	–	NC	do not connect, reserved for future extensions and for testing
DNC3	123	A13	NC	do not connect, reserved for future extensions and for testing
DNC4	124	B12	NC	do not connect, reserved for future extensions and for testing
DNC5	125	A12	I	do not connect, reserved for future extensions and for testing
XTRI	126	B11	I	X-port output control signal, affects all X-port pins (XPD7 to XPD0, XRH, XRV, XDQ and XCLK), enable and active polarity is under software control
XPD7	127	C11	I/O	MSB0 of expansion port data
XPD6	128	A11	I/O	MSB1 of expansion port data
V _{SSD9}	129	D11	P	digital ground 9 (peripheral cells)
XPD5	130	B10	I/O	MSB2 of expansion port data
XPD4	131	A10	I/O	MSB3 of expansion port data

SYMBOL	PIN		TYPE ⁽¹⁾	DESCRIPTION
	QFP160	BGA156		
V _{DDD10}	132	C10	P	digital supply voltage 10 (core, 1.8 V)
V _{SSD10}	133	D10	P	digital ground 10 (core)
XPD3	134	B9	I/O	MSB4 of expansion port data
XPD2	135	A9	I/O	MSB5 of expansion port data
V _{DDD11}	136	C9	P	digital supply voltage 11 (peripheral cells, 3.3 V)
V _{SSD11}	137	D9	P	digital ground 11 (peripheral cells)
XPD1	138	B8	I/O	MSB6 of expansion port data
XPD0	139	A8	I/O	LSB of expansion port data
XRV	140	D8	I/O	vertical reference I/O expansion port
XRH	141	C7	I/O	horizontal reference I/O expansion port
V _{DDD12}	142	C8	P	digital supply voltage 12 (core, 1.8 V)
XCLK	143	A7	I/O	clock I/O expansion port
XDQ	144	B7	I/O	data qualifier for expansion port or Source-Select (pixelwise switch between X-port input/decoder output)
V _{SSD12}	145	D7	P	digital ground 12 (core; connects to substrate)
XRDY	146	A6	O	task flag or ready signal from the region and field processing, I ² C-controlled
$\overline{\text{TRST}}$	147	C6	I/pu	test reset input (active LOW), for boundary scan test (with internal pull-up); notes 2, 3 and 4
TCK	148	B6	I/pu	test clock for boundary scan test; note 2
TMS	149	D6	I/pu	test mode select input for boundary scan test or scan test; note 2
TDO	150	A5	O	test data output for boundary scan test; note 2
V _{DDD13}	151	C5	P	digital supply voltage 13 (peripheral cells, 3.3 V)
TDI	152	B5	I/pu	test data input for boundary scan test; note 2
V _{SSD13}	153	D5	P	digital ground 13 (peripheral cells)
V _{SS(xtal)}	154	A4	P	ground for crystal oscillator
XTALI	155	B4	I	input terminal for 24.576 MHz (32.11 MHz) crystal oscillator or connection of external oscillator
XTALO	156	A3	O	24.576 MHz (32.11 MHz) crystal oscillator output; do not connect if clock input of XTALI is used
V _{DD(xtal)}	157	B3	P	supply voltage for crystal oscillator (1.8 V)
XTOUT	158	A2	O	crystal oscillator output signal; auxiliary signal
DNC9	159	C3	NC	do not connect, reserved for future extensions and for testing
DNC10	160	C4	NC	do not connect, reserved for future extensions and for testing

Notes

1. I = input, O = output, P = power, NC = not connected, st = strapping, pu = pull-up, pd = pull-down, od = open-drain.
2. In accordance with the "IEEE1149.1" standard the pads TDI, TMS, TCK and $\overline{\text{TRST}}$ are input pads with an internal pull-up transistor and TDO is a 3-state output pad.
3. For board design without boundary scan implementation connect the $\overline{\text{TRST}}$ pin to ground.

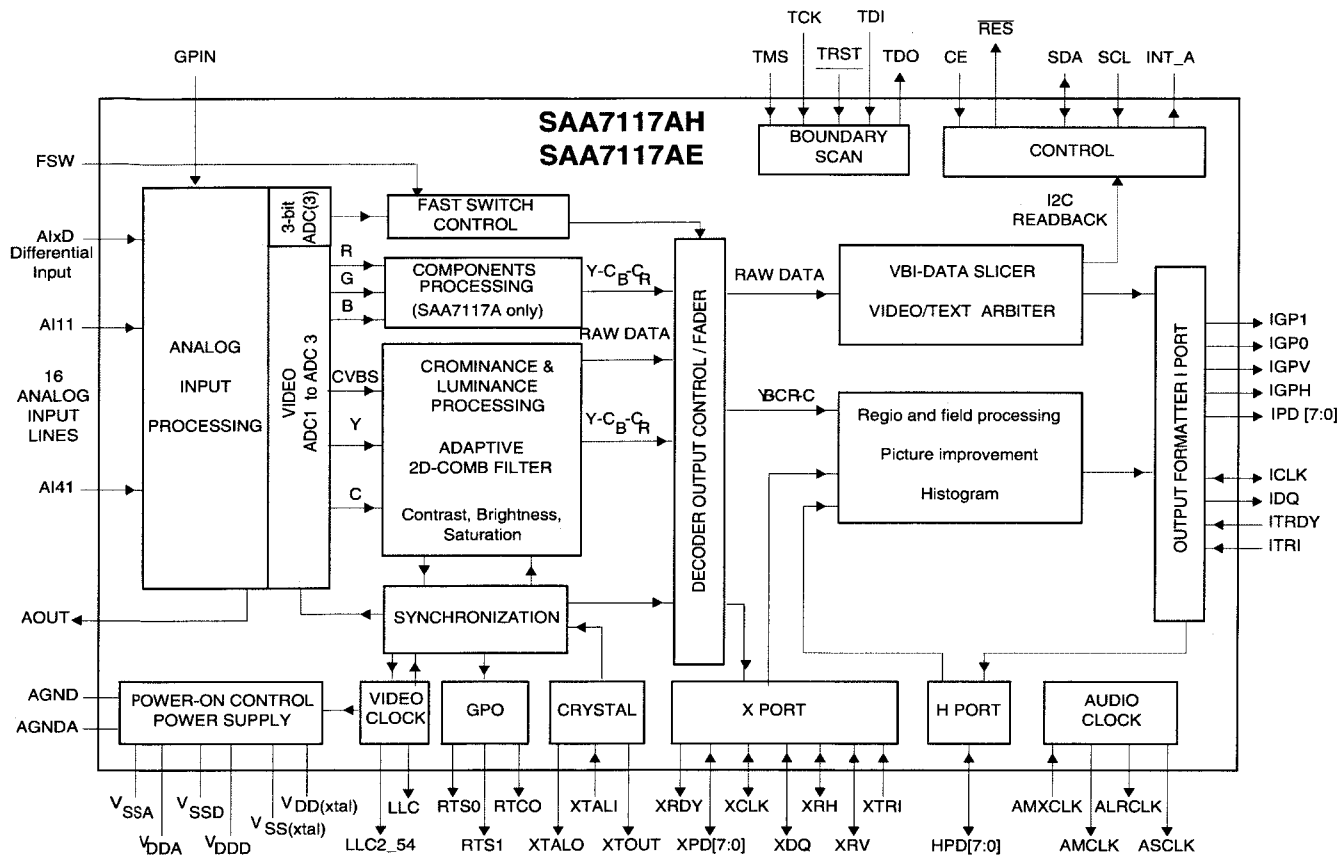


Fig.5 SAA7117(A)H/E block diagram.

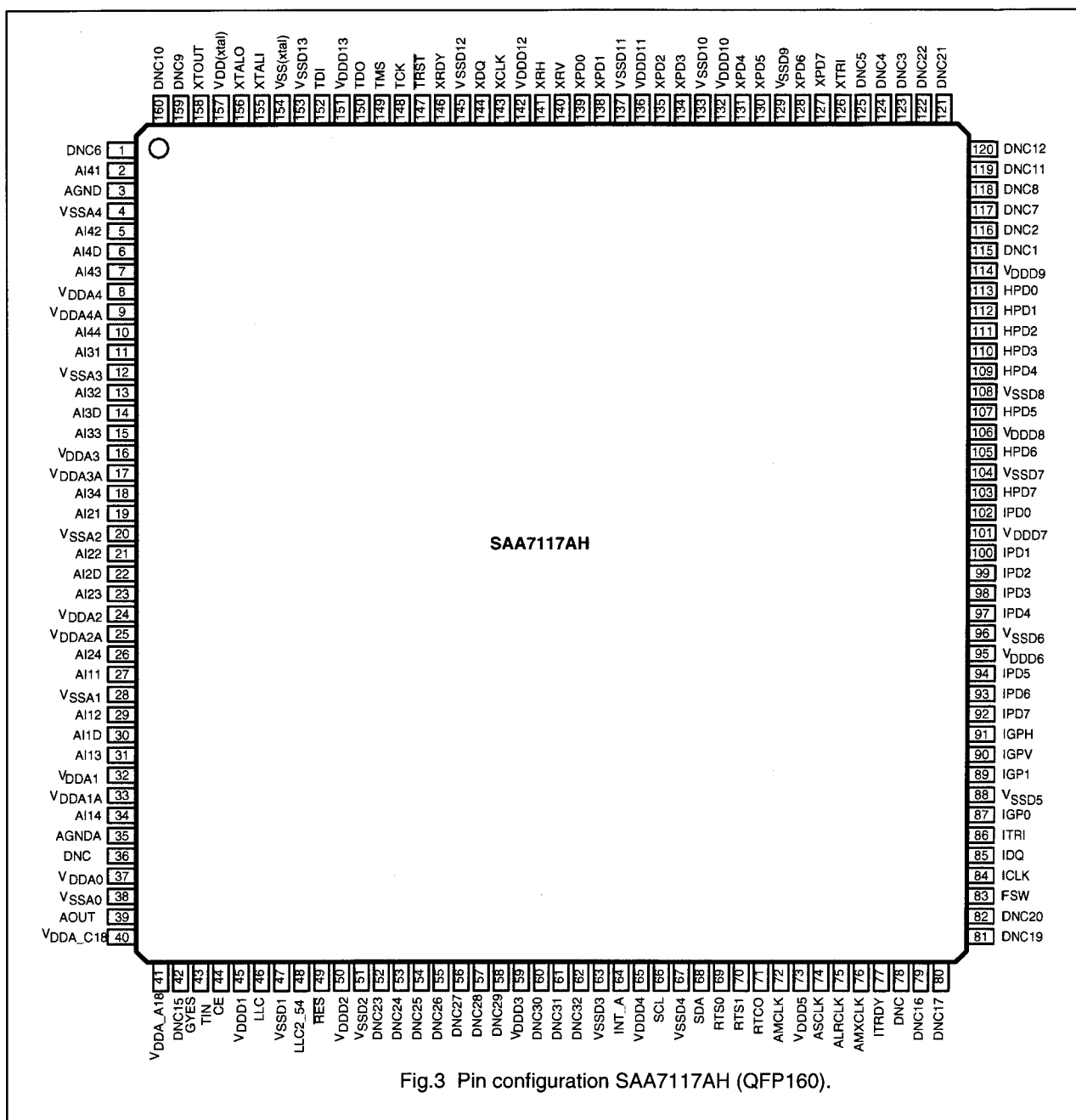


Fig.3 Pin configuration SAA7117AH (QFP160).

**IIC 7301 NCP1571D, LECO Board, Low Volatge Buck
Controller**

PACKAGE PIN DESCRIPTION

PACKAGE PIN #	PIN SYMBOL	FUNCTION
1	V _{CC}	Power supply input.
2	PWRGD	Open collector output goes low when V _{FB} is out of regulation. User must externally limit current into this pin to less than 20 mA.
3	PGDELAY	External capacitor programs PWRGD low-to-high transition delay.
4	COMP	Error amp output. PWM comparator reference input. A capacitor to LGND provides error amp compensation and Soft Start. Pulling pin < 0.475 V locks gate outputs to a zero percent duty cycle state.
5	GATE(H)	High-side switch FET driver pin. Capable of delivering peak currents of 1.5 A.
6	GATE(L)	Low-side synchronous FET driver pin. Capable of delivering peak currents of 1.5 A.
7	V _{FB}	Error amplifier and PWM comparator input.
8	GND	Power supply return.

NCP1571

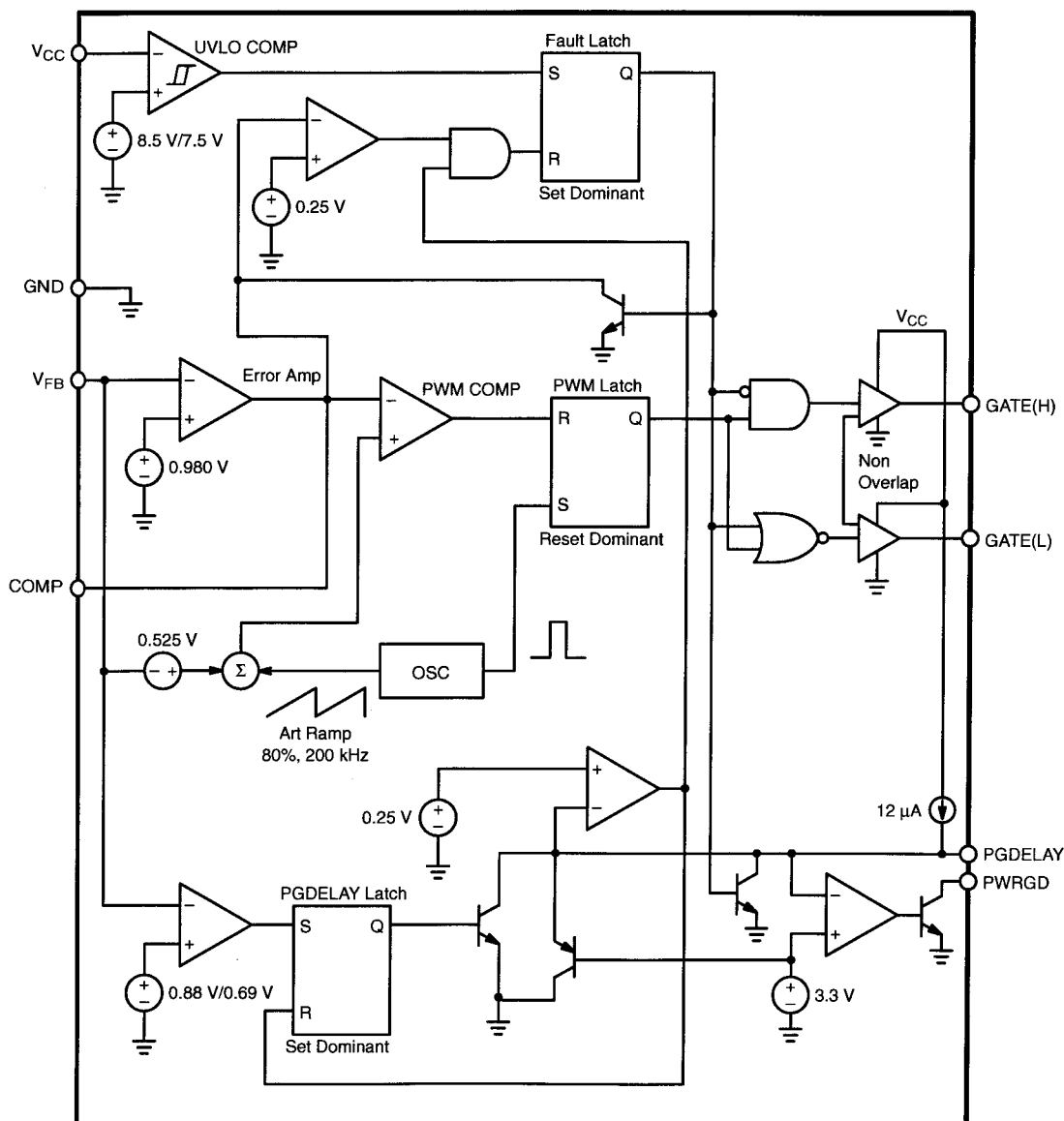
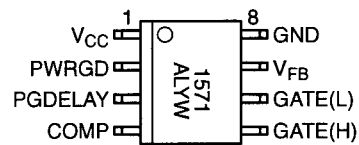


Figure 2. Block Diagram

PIN CONNECTIONS AND MARKING DIAGRAM



A = Assembly Location
 L = Wafer Lot
 Y = Year
 W = Work Week

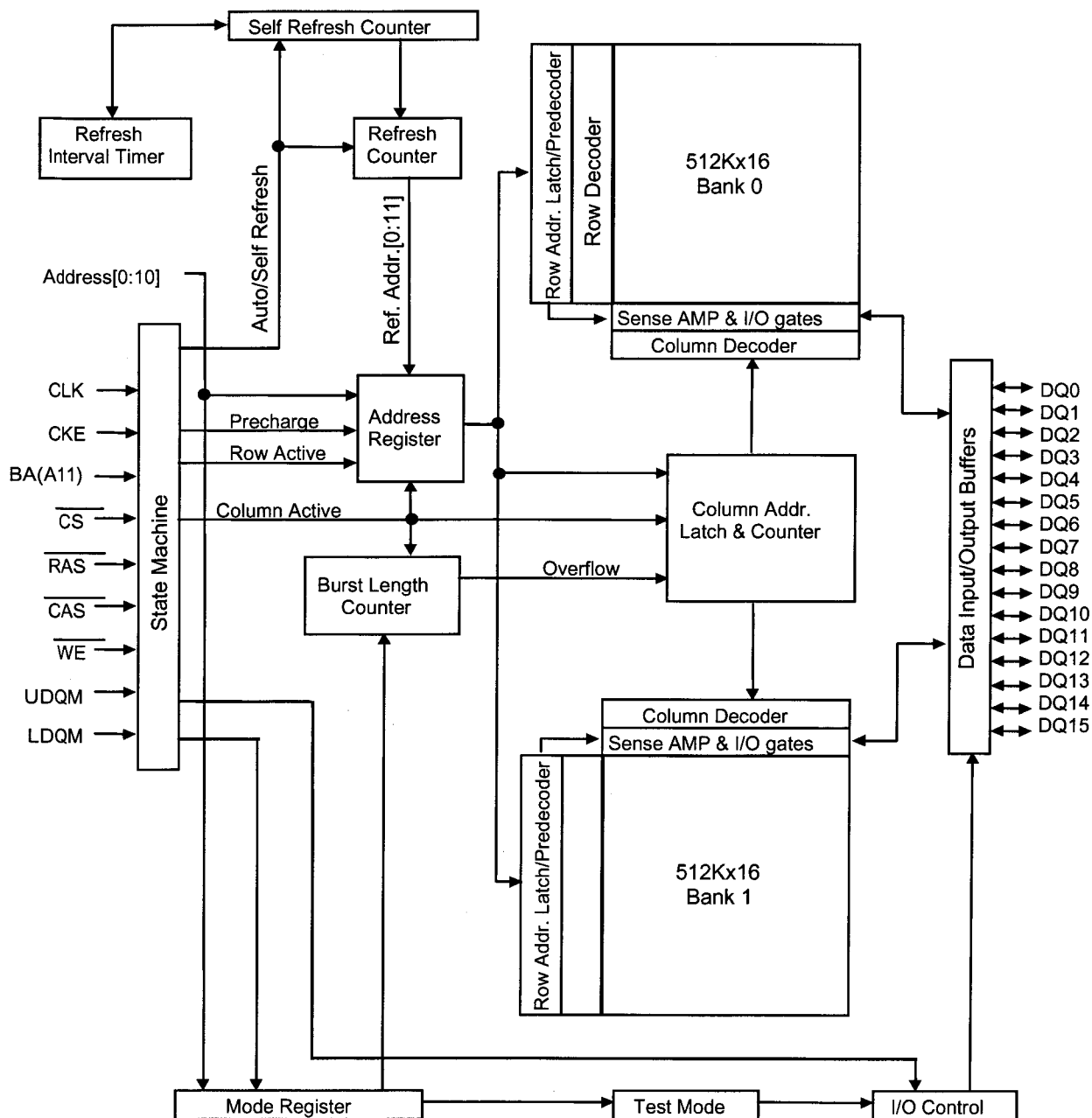
**IC 7505 HY57V161610ET-7, LECO Board, 2 Banks x 512K x
 16 Bit Synchronous DRAM**

PIN DESCRIPTION

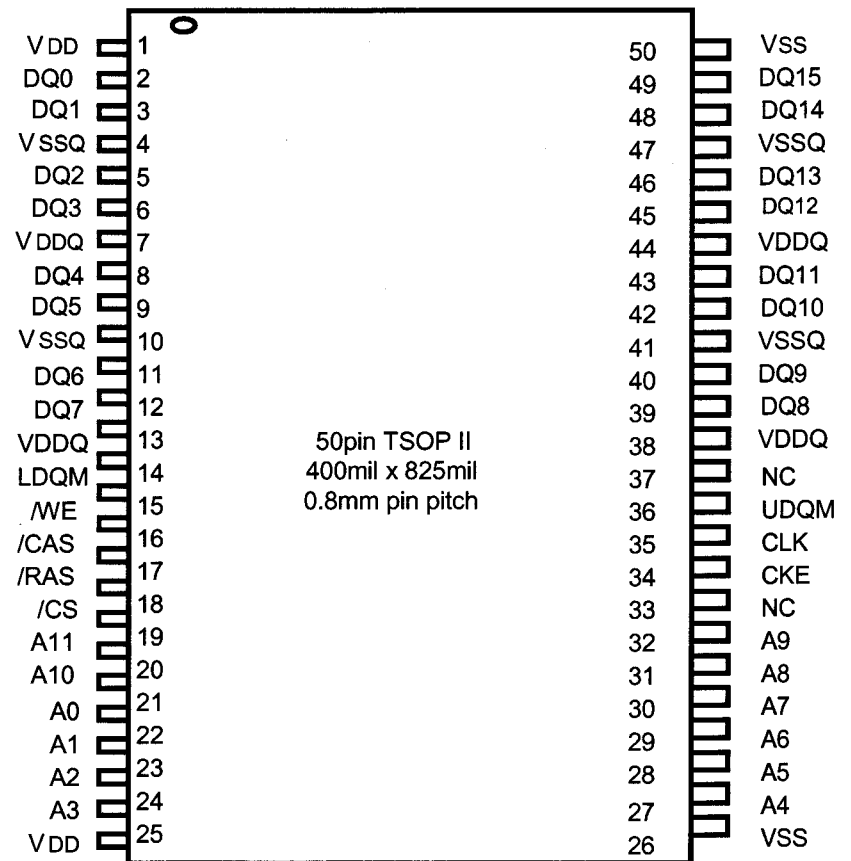
PIN	PIN NAME	DESCRIPTION
CLK	Clock	The system clock input. All other inputs are referenced to the SDRAM on the rising edge of CLK.
CKE	Clock Enable	Controls internal clock signal and when deactivated, the SDRAM will be one of the states among power down, suspend or self refresh.
$\overline{\text{CS}}$	Chip Select	Command input enable or mask except CLK, CKE and DQM
BA	Bank Address	Select either one of banks during both $\overline{\text{RAS}}$ and $\overline{\text{CAS}}$ activity.
A0 ~ A10	Address	Row Address : RA0 ~ RA10, Column Address : CA0 ~ CA7 Auto-precharge flag : A10
$\overline{\text{RAS}}$, $\overline{\text{CAS}}$, $\overline{\text{WE}}$	Row Address Strobe, Column Address Strobe, Write Enable	$\overline{\text{RAS}}$, $\overline{\text{CAS}}$ and $\overline{\text{WE}}$ define the operation. Refer function truth table for details
LDQM, UDQM	Data Input/Output Mask	DQM control output buffer in read mode and mask input data in write mode
DQ0 ~ DQ15	Data Input/Output	Multiplexed data input / output pin
VDD/VSS	Power Supply/Ground	Power supply for internal circuit and input buffer
VDDQ/VSSQ	Data Output Power/Ground	Power supply for DQ
NC	No Connection	No connection

FUNCTIONAL BLOCK DIAGRAM

1Mx16 Synchronous DRAM



PIN CONFIGURATION



IC 7501 PNX7860E, LECO Board, High speed processor for DVD+R/RW & CD-R/RW

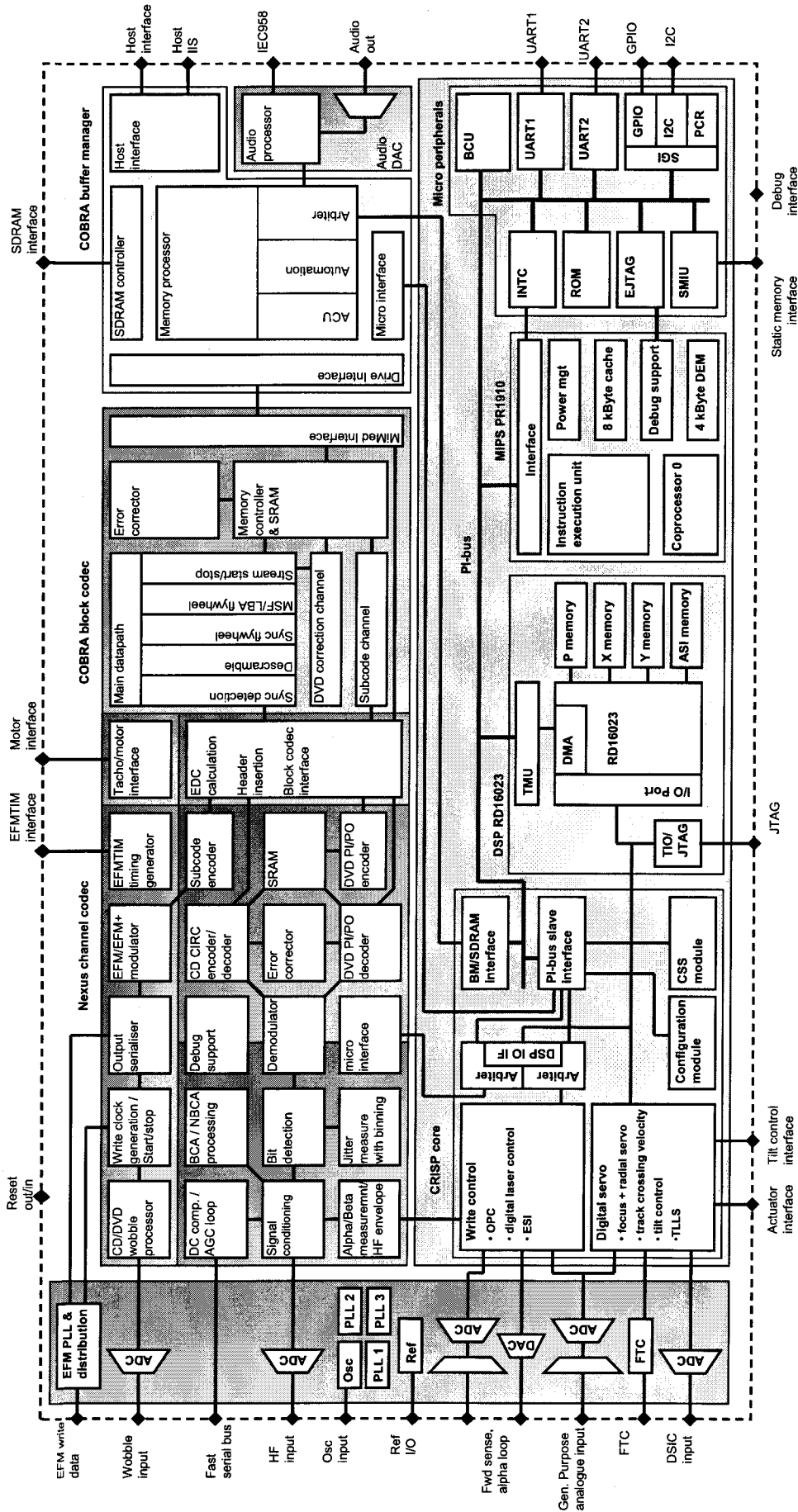


Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
RFP	U1	AI	differential RF input positive	
RFN	U2	AI	differential RF input negative	
RFREF	T1	AO	common mode reference of RF input	
WIN	T2	AI	wobble input signal	
WREF	P3	AIO	wobble ADC decoupling point	
EFMCLKP	E2	DO	differential EFM clock output positive	
EFMCLKN	E1	DO	differential EFM clock output negative	
EFMDATP	F1	DO	differential EFM data output positive	
EFMDATN	F2	DO	differential EFM data output negative	
CAL_SH1	Y3	DO	Signal used for drive calibration	
CAL_SH2	Y4	DO	Signal used for drive calibration	
TIMRS	AA1	DO	EFMTIM RF sampling signal	
TIMTH1	Y2	DO	EFMTIM input sampling signal 1	
TIMTH2	Y1	DO	EFMTIM input sampling signal 2	
TIMREF	AA2	DO	EFMTIM slicer reference level	
TIMRWN	AB1	DO	EFMTIM read/write signal for preprocessor	
LDRWN	AB2	DO	Codec read/write signal for laser driver (LASERON)	
WSB	AA3	DO	Bank signal for Write strategy	
VTHR	H1	AI	Threshold voltage from Elantec laser driver	
VDEL	H2	AI	Delta voltage from Elantec laser driver	
AMEAS	J2	AI	Alpha measurement from Cheetah	
IAPCR	G1	AO	Threshold power control to Elantec laser driver	
IAPCW	G2	AO	Delta reference current to Elantec laser driver	
VOPUREF	H3	AIO	Reference voltage to OPU shared with VREFIN	
VREF_LCA	J3	AIO	Laconic reference voltage input	
VREFH	H4	AIO	Decoupling point for Laconic function	
VREFL	J4	AIO	Decoupling point for Laconic function	
LASP	J1	AO	laser power signal to pre-processor	
DAC0_STEP_A0	V3	AODO	general purpose DAC output	LADIC step output
GPIO50_ESEN	Y9	B	PI-GPIO 5.0 / DSP GPIO 0	serial enable to Elantec laser driver
GPIO51_ESCLK	Y7	B	PI-GPIO 5.1 / DSP GPIO 1	serial clock to Elantec laser driver
GPIO52_ESDIO	W7	B	PI-GPIO 5.2 / DSP GPIO 2	serial data to/from Elantec laser driver

Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
GPIO53	W9	B	PI-GPIO 5.3 / DSP GPIO 3	
AUX1_A1	M3	AI	aux ADC input 1 / max value of EFM signal (external beta)	
AUX2_A2	M2	AI	aux ADC input 2 / min value of EFM signal (external beta)	
AUX3_CALF	M1	AI	aux ADC input 3 / average value of EFM signal (if DSIC not used)	
AUX4_VOLUME	L3	AI	aux ADC input 4 / headphone volume setting	
AUX5_SINPHI	L2	AI	aux ADC input 5 / sine input from PCS Hall amplifiers	
AUX6_COSPHI	L1	AI	aux ADC input 6 / cosine input from PCS Hall amplifiers	
AUX7_TEMP	K2	AI	aux ADC input 7 / actuator temperature	
AUX8_ACTEMF	K1	AI	aux ADC input 8 / EMF for actuator damping	
GPAIREF	L4	AO	top of the ADC ladder (to be connected to analogue VDDA)	
D1_TILT	N2	AI	normalised tilt signal	
D2_TLN	N1	AI	norm. track-loss signal	
D3_REN	P2	AI	norm. radial error signal	
D4_FEN	P1	AI	norm. focus error signal	
S1_MIRN	R2	AI	norm. mirror signal	
S2_XDN	R1	AI	XDN input	
LFREF	M4	AIO	I/O voltage ref. for servo ADC	
IREF	P4	AI	analogue current reference	
FTC	T3	AI	fast track count input	
EC	B1	DO	EMF control (torque control pin on motor driver)	
FG	B2	DIH	Frequency generator (tacho pulse from motor driver)	
RA	A2	DO	radial output (tri-state during reset)	
SL	A1	DO	sledge output (tri-state during reset)	
FO	A4	DO	focus output (tri-state during reset)	
SERVOREF	C4	DO	Programmable PDM output used as reference	
GPIO30_REFSIN	C6	B	PI-GPIO 3.0	PCS sinphi DC offset cancellation
GPIO31_REFCOS	C7	B	PI-GPIO 3.1	PCS cosphi DC offset cancellation
GPIO32_TOS	A3	B	PI-GPIO 3.2	tilt sine output
GPIO33_TOC	B3	B	PI-GPIO 3.3	tilt cosine output
GPIO34_TOSTOCEN	C5	BPU	PI-GPIO 3.4	tilt sine/cosine driver enable
MIUD0	A22	B	Memory interface data 0	

Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
MIUD1	A21	B	Memory interface data 1	
MIUD2	A20	B	Memory interface data 2	
MIUD3	A19	B	Memory interface data 3	
MIUD4	A18	B	Memory interface data 4	
MIUD5	A17	B	Memory interface data 5	
MIUD6	A16	B	Memory interface data 6	
MIUD7	A15	B	Memory interface data 7	
MIUD8	B21	B	Memory interface data 8	
MIUD9	B20	B	Memory interface data 9	
MIUD10	B19	B	Memory interface data 10	
MIUD11	B18	B	Memory interface data 11	
MIUD12	B17	B	Memory interface data 12	
MIUD13	B16	B	Memory interface data 13	
MIUD14	B15	B	Memory interface data 14	
MIUD15	B14	B	Memory interface data 15	
GPIO35_MIUUBN	C18	B	PI-GPIO 3.5	upper byte enable
GPIO36_MIULBN	C17	B	PI-GPIO 3.6	lower byte enable
GPIO37_MIUA0	C11	B	PI-GPIO 3.7	Memory interface address 0
MIUA1	C22	DO	Memory interface address 1	
MIUA2	B4	DO	Memory interface address 2	
MIUA3	A5	DO	Memory interface address 3	
MIUA4	B5	DO	Memory interface address 4	
MIUA5	A6	DO	Memory interface address 5	
MIUA6	B6	DO	Memory interface address 6	
MIUA7	A7	DO	Memory interface address 7	
MIUA8	B7	DO	Memory interface address 8	
MIUA9	A10	DO	Memory interface address 9	
MIUA10	B10	DO	Memory interface address 10	
MIUA11	A11	DO	Memory interface address 11	
MIUA12	B11	DO	Memory interface address 12	
MIUA13	A12	DO	Memory interface address 13	
MIUA14	B12	DO	Memory interface address 14	
MIUA15	A13	DO	Memory interface address 15	
MIUA16	B13	DO	Memory interface address 16	
MIUA17	A14	DO	Memory interface address 17	
MIUA18	A8	DO	Memory interface address 18	
MIUA19	B8	DO	Memory interface address 19	
MIUCS3	C21	DO	Chip select 3 (ext. ROM)	
MIUWEN	A9	DO	Write enable	
MIUOEN	B22	DO	Output enable	

Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
GPIO10_MIUA20	B9	B	PI-GPIO 1.0 / PI interrupt 0	Memory interface address 20 (default after reset)
GPIO11_MIUA21	C14	B	PI-GPIO 1.1 / PI interrupt 1	Memory interface address 21
GPIO12_IEC958	D22	B	PI-GPIO 1.2 / PI interrupt 2	IEC958 output
GPIO13_SHOCKIN	C9	B	PI-GPIO 1.3 / PI interrupt 3	Shock sensor input
GPIO14_SILD2	C8	B	PI-GPIO 1.4 / PI interrupt 4	SILD for second preprocessor
GPIO15_MIURDY	C15	B	PI-GPIO 1.5 / PI interrupt 5	Memory interface ready
GPIO16_MIUCS0	C16	B	PI-GPIO 1.6 / PI interrupt 6	Chip select 0
GPIO17_MIUCS1	C13	B	PI-GPIO 1.7 / PI interrupt 7	Chip select 1
GPIO20_MIUCS2	C12	B	PI-GPIO 2.0	Chip select 2
GPIO21_TXD1	F21	B	PI-GPIO 2.1	TXD1
GPIO22_RXD1	E21	B	PI-GPIO 2.2	RXD1
GPIO23_TXD2	E22	B	PI-GPIO 2.3	TXD2
GPIO24_RXD2	D21	B	PI-GPIO 2.4	RXD2
GPIO25_SIDA	AA4	B	PI-GPIO 2.5	SIDA for preprocessor
GPIO26_SICL	AB3	B	PI-GPIO 2.6	SICL for preprocessor
GPIO27_SILD	AB4	B	PI-GPIO 2.7	SILD for preprocessor
SCL	W5	IIC	I2C serial clock	
SDA	Y5	IIC	I2C serial data	
DD0	N21	B	Host interface data bus 0	Generic DMA data bus 0
DD1	P21	B	Host interface data bus 1	Generic DMA data bus 1
DD2	R21	B	Host interface data bus 2	Generic DMA data bus 2
DD3	T21	B	Host interface data bus 3	Generic DMA data bus 3
DD4	U21	B	Host interface data bus 4	Generic DMA data bus 4
DD5	V21	B	Host interface data bus 5	Generic DMA data bus 5
DD6	W21	B	Host interface data bus 6	Generic DMA data bus 6
DD7	Y21	B	Host interface data bus 7	Generic DMA data bus 7
DD8	Y22	B	Host interface data bus 8	Generic DMA data bus 8
DD9	W22	B	Host interface data bus 9	Generic DMA data bus 9
DD10	V22	B	Host interface data bus 10	Generic DMA data bus 10
DD11	U22	B	Host interface data bus 11	Generic DMA data bus 11
DD12	T22	B	Host interface data bus 12	Generic DMA data bus 12
DD13	R22	B	Host interface data bus 13	Generic DMA data bus 13
DD14	P22	B	Host interface data bus 14	Generic DMA data bus 14
DD15	N22	B	Host interface data bus 15	Generic DMA data bus 15
DMARQ_GACK	M22	DO	Host interface DMA request	Generic DMA acknowledge
DMACK_GREQ	K22	DIH	Host interface DMA acknowledge	Generic DMA request
DIOW	M21	DI	Host interface write strobe	
DIOR	L22	DI	Host interface read strobe	
IORDY	L21	DO	Host interface ready	
INTRQ	K21	DO	Host interface interrupt request	

Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
DA0_GFB	H22	BH	Host interface address 0	Generic DMA first byte signal
DA1_GWR	J22	BH	Host interface address 1	Generic DMA write strobe
DA2_GRD	H21	BH	Host interface address 2	Generic DMA read strobe
PDIAG	J21	B	Host interface passed test	
CS0	G22	DIH	Host interface chip select 0	
CS1	G21	DIH	Host interface chip select 1	
DASP	F22	BOD	Host interface active slave present	
HRESET	Y20	DIH	Host reset	
GPIO54_BCLK	R20	B	PI-GPIO 5.4 / DSP GPIO 4	Host I2S bit clock output
GPIO55_WCLK	T20	B	PI-GPIO 5.5 / DSP GPIO 5	Host I2S word clock output
GPIO56_DATA	U20	B	PI-GPIO 5.6 / DSP GPIO 6	Host I2S data input/output
GPIO57_SYNC	V20	B	PI-GPIO 5.7 / DSP GPIO 7	Host I2S sync input/output
XDA0	AA6	DO	SDRAM address	
XDA1	AB6	DO	SDRAM address	
XDA2	AA5	DO	SDRAM address	
XDA3	AB5	DO	SDRAM address	
XDA4	AB22	DO	SDRAM address	
XDA5	AA21	DO	SDRAM address	
XDA6	AB21	DO	SDRAM address	
XDA7	AA20	DO	SDRAM address	
XDA8	AB20	DO	SDRAM address	
XDA9	AA19	DO	SDRAM address	
XDA10	AB7	DO	SDRAM address	
XDA11	AB19	DO	SDRAM address	
XDA12	Y17	DO	SDRAM address/bank select	
XDA13	AB8	DO	SDRAM address/bank select	
XDA14	AA7	DO	SDRAM address/bank select	
XDD0	AA10	B	SDRAM data bus	
XDD1	AB11	B	SDRAM data bus	
XDD2	AA11	B	SDRAM data bus	
XDD3	AB12	B	SDRAM data bus	
XDD4	AA12	B	SDRAM data bus	
XDD5	AB13	B	SDRAM data bus	
XDD6	AA13	B	SDRAM data bus	
XDD7	AB14	B	SDRAM data bus	
XDD8	AA14	B	SDRAM data bus	
XDD9	AB15	B	SDRAM data bus	
XDD10	AA15	B	SDRAM data bus	

Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
XDD11	AB16	B	SDRAM data bus	
XDD12	AA16	B	SDRAM data bus	
XDD13	AB17	B	SDRAM data bus	
XDD14	AA17	B	SDRAM data bus	
XDD15	AB18	B	SDRAM data bus	
XWR	AB10	B	SDRAM write strobe	
XRAS	AB9	B	SDRAM RAS strobe	
XCAS	AA9	B	SDRAM CAS	
XCS	AA8	B	SDRAM chip select	
XCLK	AA18	DO	SDRAM clock	
XDQM	Y18	DO	SDRAM data mask high/low (UDQM/LDQM)	
XCKE	AA22	DO	SDRAM clock enable	
DAC_HP_R	C1	AO	DAC headphone output right	
DAC_LO_R	C2	AO	DAC line output right	
DAC_VREF	C3	AI	DAC voltage reference	
DAC_LO_L	D1	AO	DAC line output left	
DAC_HP_L	D2	AO	DAC headphone output left	
DAC_VPOS	D4	VDDA	DAC supply positive	
DAC_VNEG	D3	VSSA	DAC supply negative	
OSC_IN	V1	AI	crystal oscillator input	
OSC_OUT	V2	AO	crystal oscillator output	
POR_OUTN	W2	BOD	power-on reset output, active low, open drain	
POR_NEG	W3	DIHPU	active low power-on-reset	
PCODE	W11	DIHPD	Test pin, do not connect in application	
TDI	W17	DIPU	JTAG test data input	
TDO	W18	DO	JTAG test data output	
TMS	Y15	DIPU	JTAG test mode select	
TCK	W15	DIHPD	JTAG test clock	
TRST	W13	DIPU	JTAG test reset, external pull-down resistor required, see IEEE 1149.1.	
ADBG0	F20	B	Application debug signal 0 (tri-state default)	
ADBG1	G20	B	Application debug signal 1 (tri-state default)	
ADBG2	H20	B	Application debug signal 2 (tri-state default)	
ADBG3	J20	B	Application debug signal 3 (tri-state default)	
ADBG4	E20	B	Application debug signal 4 (tri-state default)	

Table 3: Pinning list

Symbol	Pin	Type	Main function	Alternative function
ADBG5	N20	B	Application debug signal 5 (tri-state default)	
ADBG6	K20	B	Application debug signal 6 (tri-state default)	
ADBG7	L20	B	Application debug signal 7 (tri-state default)	
ADBG8	M20	BPD	Application debug signal 8 (tri-state default)	PORCONF0
ADBG9	W20	BPD	Application debug signal 9 (tri-state default)	PORCONF1
ADBG10	D20	BPD	Application debug signal 10 (tri-state default)	PORCONF2
ADBG11	P20	BPD	Application debug signal 11 (tri-state default)	PORCONF3
ADBG12	C20	BPD	Application debug signal 12 (tri-state default)	PORCONF4
ADBG13	C19	BPD	Application debug signal 13 (tri-state default)	PORCONF5
VSSA1	G3	VSSA	analogue ground	
VDDA1	G4	VDDA	analogue supply (3.3V)	
VSSA2	K3	VSSA	analogue ground	
VDDA2	K4	VDDA	analogue supply (3.3V)	
VSSA3	N3	VSSA	analogue ground	
VDDA3	N4	VDDA	analogue supply (3.3V)	
VSSA4	R3	VSSA	analogue ground	
VDDA4	R4	VDDA	analogue supply (3.3V)	
VSSA5	U3	VSSA	analogue ground	
VDDA5	U4	VDDA	analogue supply (3.3V)	
VDD3P1	V4	VDDD	pad digital supply (3.3V)	
VSS3P1	W4	VSSD	digital ground	
VDD3P2	W6	VDDD	pad digital supply (3.3V)	
VSS3P2	Y6	VSSD	digital ground	
VDD3P3	W8	VDDD	pad digital supply (3.3V)	
VSS3P3	Y8	VSSD	digital ground	
VDD3P4	W12	VDDD	pad digital supply (3.3V)	
VSS3P4	Y12	VSSD	digital ground	
VDD3P5	W14	VDDD	pad digital supply (3.3V)	
VSS3P5	Y14	VSSD	digital ground	
VDD3P6	W19	VDDD	pad digital supply (3.3V)	
VSS3P6	Y19	VSSD	digital ground	
VDD3P7	V19	VDDD	pad digital supply (3.3V)	
VSS3P7	U19	VSSD	digital ground	
VDD3P8	P19	VDDD	pad digital supply (3.3V)	

Table 3: Pinning list

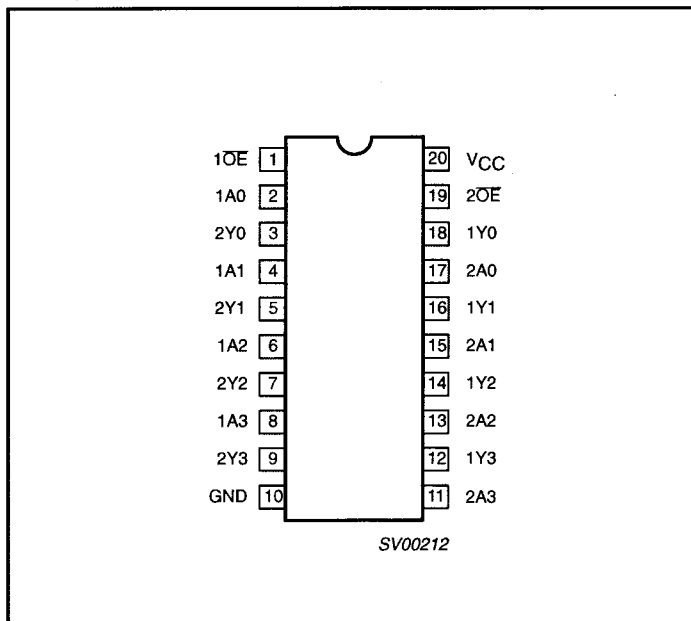
Symbol	Pin	Type	Main function	Alternative function
VSS3P8	N19	VSSD	digital ground	
VDD3P9	M19	VDDD	pad digital supply (3.3V)	
VSS3P9	L19	VSSD	digital ground	
VDD3P10	K19	VDDD	pad digital supply (3.3V)	
VSS3P10	J19	VSSD	digital ground	
VDD3P11	H19	VDDD	pad digital supply (3.3V)	
VSS3P11	G19	VSSD	digital ground	
VDD3P12	D19	VDDD	pad digital supply (3.3V)	
VSS3P12	D18	VSSD	digital ground	
VDD3P13	D15	VDDD	pad digital supply (3.3V)	
VSS3P13	D14	VSSD	digital ground	
VDD3P14	D13	VDDD	pad digital supply (3.3V)	
VSS3P14	D12	VSSD	digital ground	
VDD3P15	D9	VDDD	pad digital supply (3.3V)	
VSS3P15	D8	VSSD	digital ground	
VDD3P16	D7	VDDD	pad digital supply (3.3V)	
VSS3P16	D6	VSSD	digital ground	
VDD3P17	F4	VDDD	pad digital supply (3.3V)	
VSS3P17	F3	VSSD	digital ground	
VDD18C1	W10	VDDD	core digital supply (1.8V)	
VSS18C1	Y10	VSSD	digital ground	
VDD18C2	W16	VDDD	core digital supply (1.8V)	
VSS18C2	Y16	VSSD	digital ground	
VDD18C3	T19	VDDD	core digital supply (1.8V)	
VSS18C3	R19	VSSD	digital ground	
VDD18C4	F19	VDDD	core digital supply (1.8V)	
VSS18C4	E19	VSSD	digital ground	
VDD18C5	D17	VDDD	core digital supply (1.8V)	
VSS18C5	D16	VSSD	digital ground	
VDD18C6	D11	VDDD	core digital supply (1.8V)	
VSS18C6	D10	VSSD	digital ground	
VDD18P1	E4	VDDD	pad digital supply (1.8V)	
VSS18C7	E3	VSSD	digital ground	

IC 7802 74LVC244APW, LECO Board, Octal buffer/line driver with 5-volt tolerant inputs/outputs (3-State)

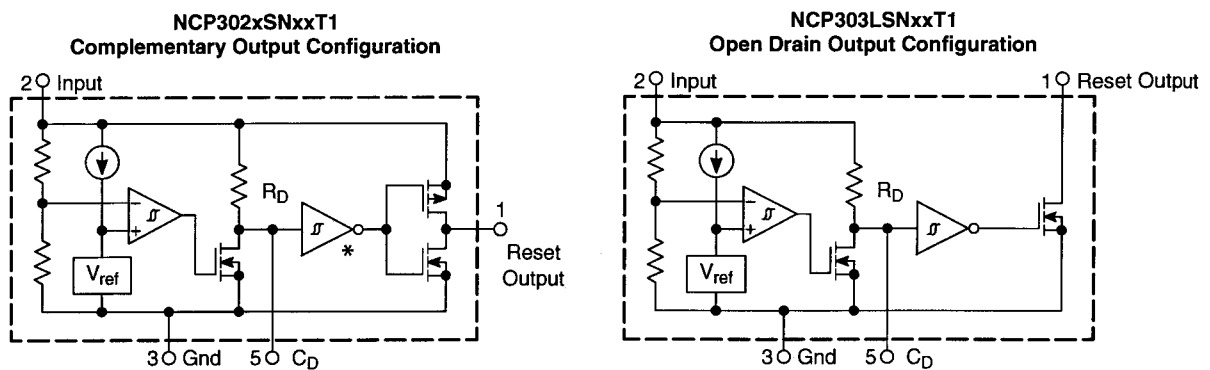
PIN DESCRIPTION

PIN NUMBER	SYMBOL	FUNCTION
1	$\overline{1OE}$	Output enable input (active LOW)
2, 4, 6, 8	$1A_0$ to $1A_3$	Data inputs
3, 5, 7, 9	$2Y_0$ to $2Y_3$	Bus outputs
10	GND	Ground (0V)
17, 15, 13, 11	$2A_0$ to $2A_3$	Bus inputs
18, 16, 14, 12	$1Y_0$ to $1Y_3$	Bus outputs
19	$\overline{2OE}$	Output enable input (active-LOW)
20	V_{CC}	Positive supply voltage

PIN CONFIGURATION



IC 7925 NCP303LSN29, LECO Board, Voltage Detector Series with Programmable Delay

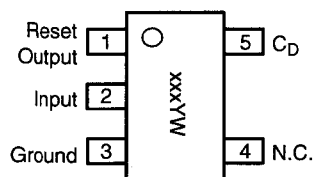


* Inverter for active low devices.
Buffer for active high devices.

This device contains 28 active transistors.

Figure 1. Representative Block Diagrams

PIN CONNECTIONS AND MARKING DIAGRAM



xxx = 302 or 303
Y = Year
W = Work Week

(Top View)

9.5 List of Abbreviations

MOB0 (Analog) Board

+5VSTBY	Permanent Supply 5V
8SC2	Pin8 Scart2 (only for Europe)
A_DATA	Data from Analog- to Digital-Board (UART-Communication)
A_RDY	Analog-board ready (status information to digital-board)
A18 - A19	Parallel Address Bus (CC - Flash-ROM and S-RAM)
A8 - A17	Parallel Address Bus (CC - Flash-ROM and S-RAM)
AD0 - AD7	Parallel Address Bus (CC - Flash-ROM and S-RAM)
AFC	Automatic Frequency Control
AFEL	Audio Frontend Left
AFER	Audio Frontend Right
AGC / WSRI	Automatic Gain Control (for Europe), Wide Screen Rear In (for NTSC)
AINFL	Audio In Front Left
AINFR	Audio In Front Right
AKILL	Audio Kill Signal
ALADC	Audio Left to ADC
ALDAC	Audio Left from DAC
ALE	Address Latch Enable
AM0	Address-mode 0
AM1	Address-mode 1
ARADC	Audio Right to ADC
ARDAC	Audio Right from DAC
ASCC1	Audio Scart 1 Mute (System Clock Output for Real time Clock-Adjustment)
AVCC	Power Supply for A/D-converter
AVSS	GND-Pin for A/D-converter
CFIN	Chroma Front In
CS0_	Chip Select 0 (CC - S-RAM)
CS2_	Chip Select 2 (CC - Flash-ROM)
CVBSFIN	Video Front In
D_DATA	Data from Digital- to Analog-Board (UART-Communication)
D_RDY	Digital-board ready (status information from digital-board)
DAC_MUTE	Mute Signal for DAC
DAOUT	Digital Audio Out
DVAL	Audio from Digital Video In Left
DVAR	Audio from Digital Video In Right
DVCC1	Power Supply Pin
DVCC2	Power Supply Pin
DVCC3	Power Supply Pin
DVSS1	GND Pin
DVSS2	GND Pin
DVSS3	GND Pin
FAN_OFF	Fan for Basic engine
FBIN	Fast Blanking input

FOME	Follow ME Status line (matching signals yes/no; only for Europe)
G1...10	DISPLAY GRID
INT	Interrupt OUT for the CC
INT	Interrupt – line from Display Print
ION	Inverse ON-Line
IPFAIL	Inverse Power Fail Detection
IPOR	Inverse Power On Reset
IRESET	Inverse Reset Input
K1	Key-Input-Line
K2	Key-Input-Line
KILL	Signal from IR-Receiver
P50 IN	P50 Input-line (only for Europe)
P50 OUT	P50 OUTput-line (only for Europe)
POR_DC	Power On Reset for Display Control Print (Ext_DL)
PSS	Output Enable Read (CC - Flash-ROM and S-RAM)
PWM_FIL	Control line for Filament Voltage Generation
PWONSW	Amplifier Switch Audio A/D Converter
RD_	Pal/Secam-Select
RECLED	Control Signal for REC-LED
RESET_DIG	Reset Line to Digital Board
RP_	Inverse Reset line to Flash-ROM
RSA1/2	Record Selector 1/2
RY/BY_	Ready/Busy – input line (from Flash-ROM)
SIF1	Sound intermediate frequency
SB1	Secam Band 1 (PCB-Test entrance)
SCL	IC-Bus
SCLSW	Switched I ² C-Bus
SDA	IC-Bus
SDASW	Switched I ² C-Bus
SFS_TS	SAW Filter Select Trap Select
STBY	Standby-Line (Flash_Toshiba)
SYNC	Video Sync input
TEMP_SENSE	Temperature Sense Line
VER	HW-version input
VFV	Video from Frontend
VKK	VFT Driver Power Supply
VREFH	Pin for Reference-voltage input to A/D-converter
VREFL	Pin for Reference-voltage input to A/D-converter
VS1/2	View Selector 1/2
WR_	Write Enable (CC - Flash-ROM and S-RAM)
WSFI	Wide Screen Signalling Front In
WU	Wake Up
X1	Oscillator Pin
X12	Oscillator Pin
XIN	Oscillator Pin
XOUT	Oscillator Pin
XT1	Low Frequency Oscillator Pin
XT2	Low Frequency Oscillator Pin
YFIN	Luminance Front In

FEBE Board (Backend part)

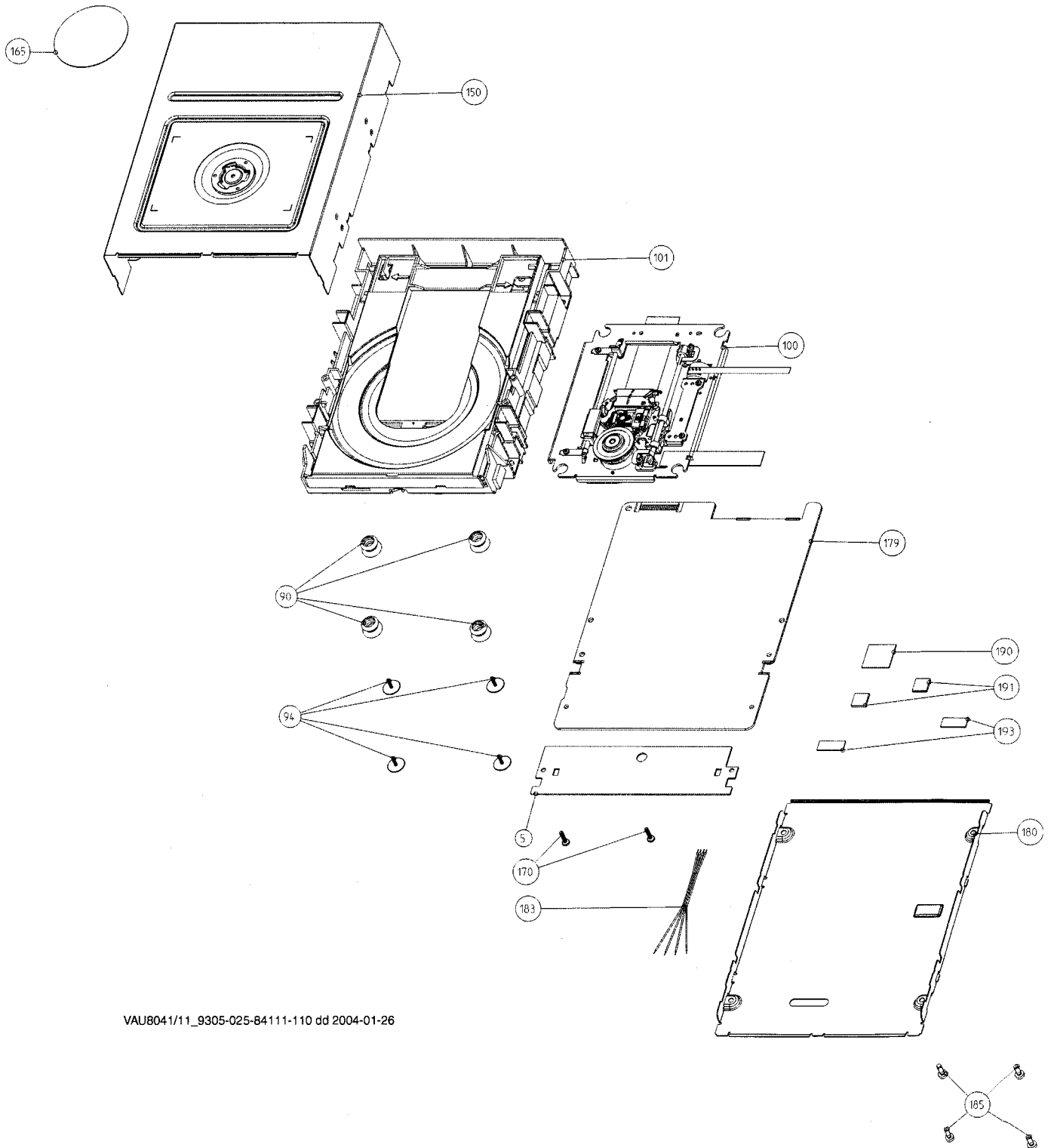
ADC	Analog to Digital Converter
DAC	Digital to Analog Converter
DENC	Digital (Video) Encoder (Video DAC)
DV	Digital Video (Camcorder)
EF	Emitter Follower
OSD	On-Screen Display
VIP	Video Input Processor (Video ADC)
2Fh	Progressive scan video
2V5	+2V5 Power supply for Link+Codec IC7431
3V3	+3V3 Power supply
3V3_A	+3V3 Analog power supply for PHY IC7400
3V3_D	+3V3 Digital power supply for PHY IC7400

3V3_DLY	+3V3 Power supply for IC7500	RESETn	DVIO board reset
3V3_LINK	+3V3 Power supply for Link+Codec IC7431	RESET_FM	Reset signal driven by Flashmaster programming device
3V3_F	+3V3 Power supply for optional Flash memory IC7432	RESTB	Reset input of Link+Codec IC7431
3V3_RAM	+3V3 Power supply for SDRAM IC7430	RTSN	Request to Send
3V3_uP	+3V3 Power supply for Micro-controller IC7802	RWZ	Parallel interface read/write control input of Link+Codec IC7431
3V3_32kHz	+3V3 Power supply for audio format adaptation circuitry IC7507 and IC7508	RXD	Receive Data
3V3_AC	+3V3 Power supply for audio system clock generator IC7605 and IC7606	SCLK	Link control output clock
+5V	+5V Power supply	TXD	Transmit Data
5V_PLL	+5V Power supply for VCO of audio PLL IC7604	VPP	+10V switchable programming voltage of microcontroller
A (1:17)	Flash address lines of uPD72893	YUV (0:7)	Digital Video
A_MUTE	Audio Mute	FEBE Board (Frontend part)	
ABCK	Audio Bit Clock	ADC	Analogue to Digital Converter
AD (1:10)	Address bus lines for Host I/F of Link+Codec IC7431	ADIP	Address In Pre-groove
AEMP1	PCM1 emphasis ON/OFF for PCM1 output	AGC	Automatic Gain Control
AFS1	Audio sampling frequency indication signal	CD	Compact Disc
ALRCLK	Audio Word Select	CLV	Constant Linear Velocity
AMCLK44	11.2896MHz (=256 * 44.1 kHz) audio master clock signal for 44.1 kHz audio	DROPP1	Dvd Rewritable Opu Pre-Processor IC
AMCLK48	12.288MHz (=256 * 48 kHz) audio master clock signal for 32 kHz and 48 kHz audio	AM	Amplitude Modulation
APWM	PWM signal for audio PLL	BE	Basic Engine
ASIC	Application Specific Integrated Circuit	ComPair	Computer aided rePair
BUFENn_AUD	Buffer Enable Audio	CD-DA	CD Digital Audio
BUFENn_VID	Buffer Enable Video	CS	Chip Select
CLK27M_CON	27MHz Clock to Digital Board	DAC	Digital to Analogue Converter
CS	Parallel interface chip select input of Link+Codec IC7431	DAIO	Digital Audio Input Output
CTL (0:1)	Link interface control lines	DENC	Digital Encoder
CTSN	Clear to Send	DFU	Direction For Use: description for the end user
D (0:15)	Flash data lines of Link+Codec IC7431	DNR	Dynamic Noise Reduction
DCDi	Directional Correlational Deinterlacing. Circuitry that reduces jaggies on diagonal edges when deinterlacing video-sourced material.	DRAM	Dynamic RAM
DV_STATUS	Interrupt pin for reading DV-status	DSD	Direct Stream Digital
HS_CLK	Video clock input of Link+Codec IC7431	DSP	Digital Signal Processing
INT	Interrupt request output of Link+Codec IC7431 (input to Micro-Controller)	DVD	Digital Versatile Disc
IOR	Parallel interface IO read control input of Link+Codec IC7431	EEPROM	Electrical Erasable Programmable ROM
ISPN	In System Programming signal (used for programming IC7802)	EFM	Eight to Fourteen bit Modulation
LKON	Link-on signal outputLPSLink power status inputLREQLink request input	FDS	Full Diagnostic Software
MA (0:10)	SDRAM address lines of Link+Codec IC7431	HF	High Frequency
MCAS	SDRAM column address strobe signal	I ² C	Integrated Ic bus (signals at 5V level)
MCLK	SDRAM clock signal	I2S	Integrated Ic Sound bus (signals at 3.3V level)
MD (0:15)	SDRAM data lines of Link+Codec IC7431	IC	Integrated Circuit
MRAS	SDRAM row-address strobe signal	IF	Intermediate Frequency
MWE	SDRAM write enable signal	IRQ	Interrupt ReQuest
PCM1	Audio Serial Data Output of Link+Codec IC7431	LADIC	LAser Driver IC
PCM1_NEW	'MSB justified' to I2S converted audio serial data; audio serial data input of audio DAC UDA1334A	LLD	Loss Less Decoder
PD (0:15)	Data bus lines for Host I/F of Link+Codec IC7431	LPCM	Linear Pulse Code Modulation
PHY_D (0:7)	Data bus connection between PHY and LINK device	LRCLK	Left/Right CLocK
		MACE	Mini All Cd Engine
		MPEG	Motion Pictures Experts Group
		NC	Not Connected
		NVM	Non Volatile Memory: IC containing DVD related data e.g. alignments
		OPC	Optimum Power Calibration
		OPU	Optical Pickup Unit
		PCB	Printed Circuit Board (see PWB)
		PCS	Position Control Sledge
		PLL	Phase Locked Loop
		PCM	Pulse Code Modulation
		PCM_CLK	Audio system clock for DAC
		PCM_OUTx	Audio serial output data
		PSU	Power Supply Unit
		PWB	Printed Wiring Board (see PCB)
		RAM	Random Access Memory
		RGB	Red, Green and Blue colour space
		ROM	Read Only Memory
		RF	Radio Frequency
		S2B	Serial to Basic engine, communication bus between host- and servo processor
		SCL	Serial Clock I ² C

SCLK	Audio serial bit clock
SDA	Serial Data I ² C
SDRAM	Synchronous DRAM
SMC	Surface Mounted Components
S/PDIF	Sony Philips Digital InterFace
SPIDRE	Signal Processing Ic for Dvd REwritable
SRAM	Static Random Access Memory
STBY	STandBY
SVCD	Super Video CD
SW	SoftWare
THD	Total Harmonic Distortion
TTL	Transistor Transistor Logic (5V logic)
uP	Microprocessor
VCD	Video CD
Y/C	Luminance (Y) and Chrominance (C) signal
YUV	Component video

10. Spare Parts List

10.1 Exploded View of FEBE Module (VAU8041)



VAU8041/11_9305-025-84111-110 dd 2004-01-26

Figure 10-1

10.2 Exploded View of Lecolite Module

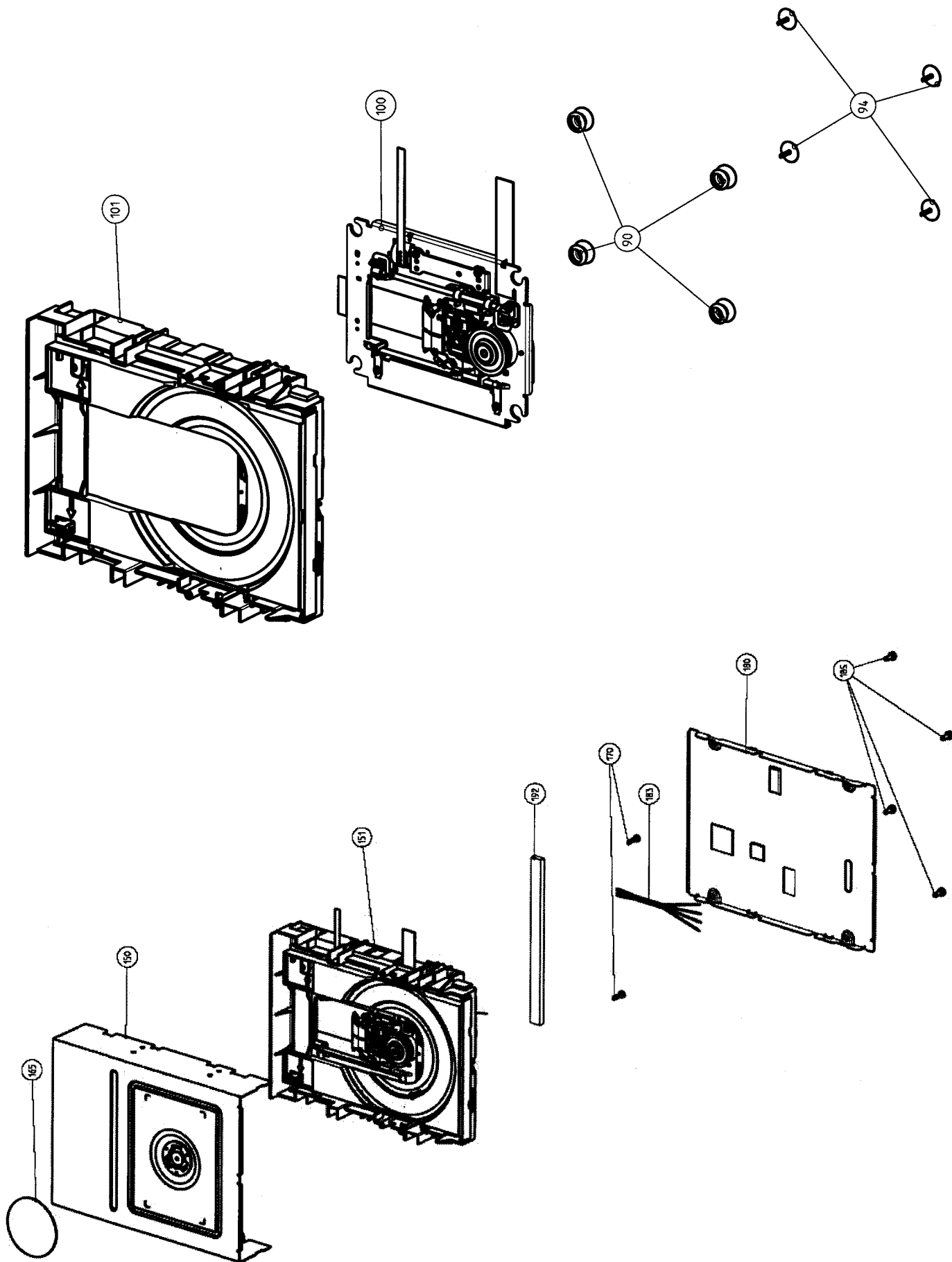
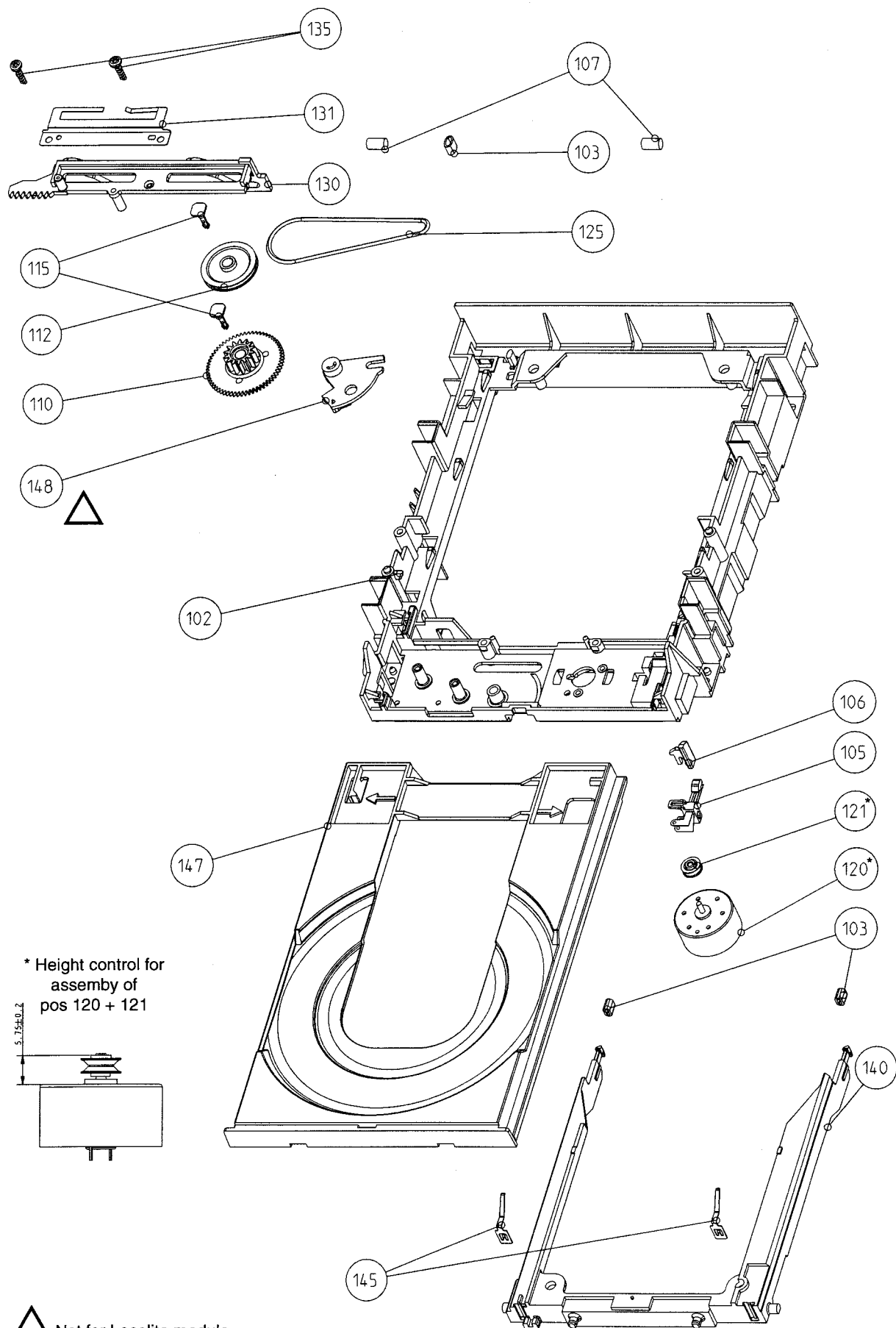
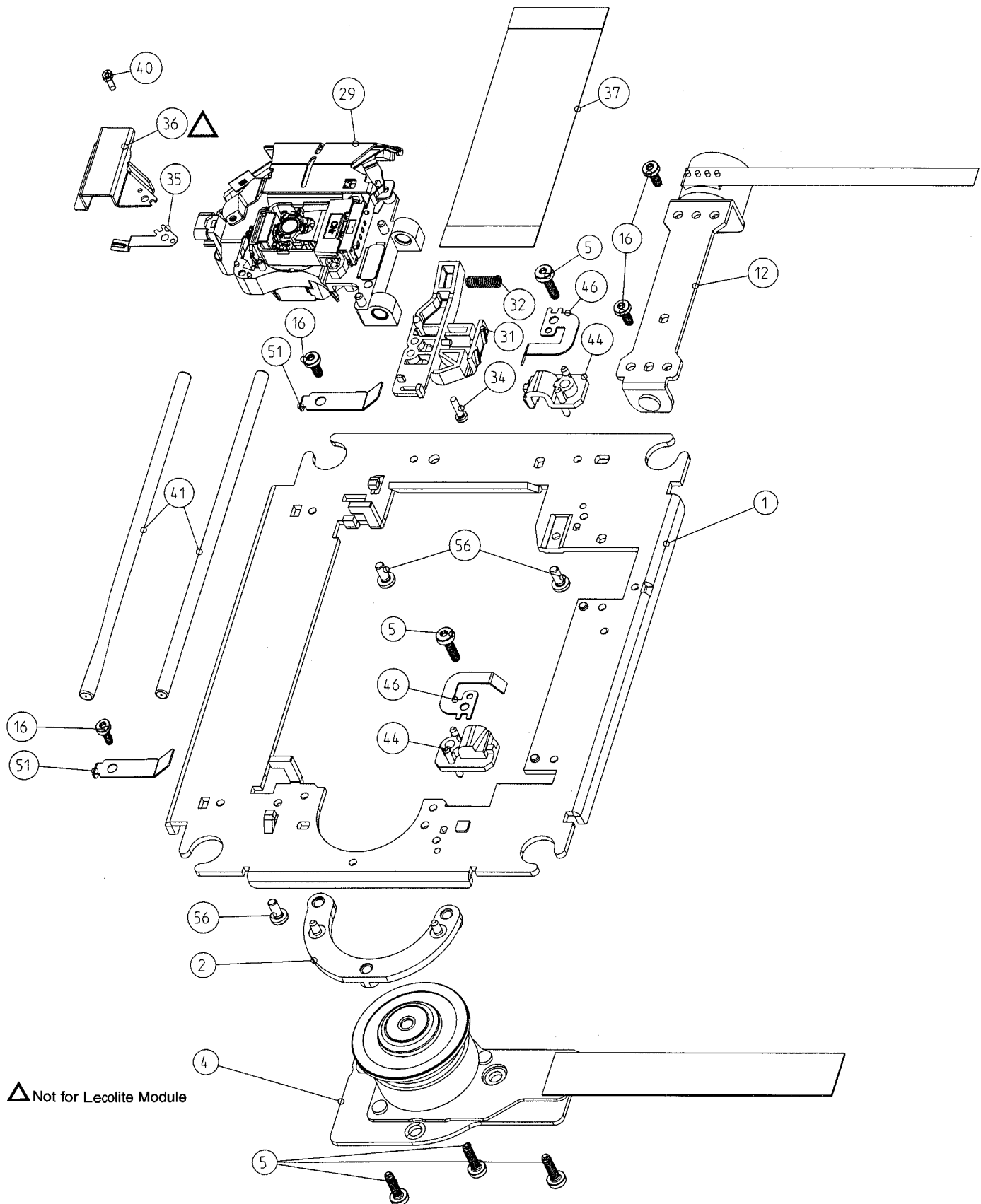


Figure 10-2

10.3 Exploded View of the Loader Mechanism



10.4 Exploded View of the DVDR Drive Mechanism



AV3.5 Mechanism_3139-197-50301-110 dd 2004-02-13 (POS)

Figure 10-4

DVDH615_00_8622-810-11632-110 dd wk417

MISCELLANEOUS - SET EXPLODED VIEW**Various**

101	3139 247 51831	BADGE PHILIPS ASSY SILVER
102	3139 244 04741	CABINET FRONT DVDR610/00/02/19/33
102	3139 244 04731	CABINET FRONT DVDR610/05
102	3139 244 04671	CABINET FRONT DVDR615/00/02/19/33
102	3139 244 04751	CABINET FRONT DVDR615/05
102	3139 244 05621	CABINET FRONT DVDR616/00/02
102	3139 244 05611	CABINET FRONT DVDR616/05
110	3139 244 04561	BUTTON STANDBY
114	3139 244 04531	BUTTON EJECT
118	3139 244 04521	BUTTON SET
122	3139 244 04491	BUTTON CAP REC
126	3139 244 04511	RING REC
130	3139 244 04501	LIGHT GUIDE REC
134	3139 244 04551	COVER TRAY
138	3103 604 00811	HOLDER COVER TRAY
147	3103 604 01141	COVER DUST
148	3103 603 20122	FOAM RUBBER SEALING
150	3139 244 04541	WINDOW DVDR610/615
150	3139 244 04711	WINDOW DVDR616
158	3139 244 04481	WINDOW LEFT DVDR610/615
158	3139 244 04701	WINDOW LEFT DVDR616
160	3139 244 04721	DOOR FLAP DVDR610
160	3139 244 04471	DOOR FLAP DVDR615/616
162	3103 604 00441	HINGE DOOR FRONT AV
164	3103 601 20231	SPRING GROUND
168	3103 601 20212	SPRING I-LINK DVDR615/616
196	3139 241 21871	COVER TOP
274	3103 604 00622	FOOT
276	3103 603 20041	CUSHION FOOT
288	4822 532 60948	BUSH, MAINS CORD
292	2822 031 01441	FAN 12VDC 0.7W 3000RPM B
333	3139 248 72121	REMOTE CONTROL
336	2422 070 98231	MAINS CORD IEC 2A5 1M8 / 00/02/19/33
336	2422 070 98236	MAINS CORD UK 5A 1M8 / 05
342	2422 076 00532	CBLE SCART 1M5 SCART 21P BK B
345	4822 320 50377	CONNECT. CABLE PAL
1001	3139 248 82891	PCBAS MOBO BOARD 04 E1
1004	9305 025 84111	VAU8041/21 (PHOS) Y DVDR610
1004	9305 025 84121	VAU8041/21 (PHOS) Y DVDR615/616
8003	3139 111 04001	FFC FOIL 15P/180/15P BD 1MMP
8007	3139 111 03991	FFC FOIL 22P/280/22P BD 1MMP
8008	3139 110 34891	FFC FOIL 22P/120/22P AD 1MMP
8010	3139 111 03981	FFC FOIL 10P/280/10P BD 1MMP
8011	2422 076 00578	CBLE IEEE1394 F/480/SHR B DVDR615/616

MISCELLANEOUS VAU8041 MODULE EXPLODED VIEW**Various**

5	3139 194 01581	SEALING STRIP
12	3104 148 01950	SLEDGE MOTOR
90	3104 144 10730	SUSPENSION
94	3139 190 40231	T6 PAN HEAD M2X8.5 TT-P SEMS FW
100	3139 197 50301	AV3.5 MECHANISM ASSY (DVD-M)
101	3139 197 60291	AV3.5 LOADER ASSY
105	3139 198 80010	SEALING STRIP
120	3139 198 00620	TRAY MOTOR
121	3104 144 04980	MOTOR PULLEY, TRAY
125	3104 144 10121	TRAY MOTOR BELT
147	3104 144 04272	TRAY

150	3139 197 60301	TOP PLATE ASSY
179	3104 128 09271	FEBE PCBA 4MB/32MB NO DV-IN DVDR610
179	3104 128 09281	FEBE PCBA 4MB/32MB W/ DV-IN DVDR615/616
190	3139 194 01541	HEAT SINK PAD (CENTAURUS)
191	3139 194 01551	HEAT SINK PAD (CHEETAH)
193	3139 194 01561	HEAT SINK PAD (DRIVER)

MISCELLANEOUS LECO MODULE EXPLODED VIEW**Various**

0012	3139 198 01201	SLEDGE MOTOR SPS-15RF-075KP
0090	3104 144 10730	SUSPENSION
0094	3139 190 40231	T6 PAN HEAD M2X8.5 TT-P SEMS FW
0100	3139 197 50341	D4.0 MECHANISM ASSY
0101	3139 197 60331	D4.0 LOADER ASSY
0105	3139 198 80010	SWITCH
0120	3139 198 01211	TRAY-MOTOR TRICORE DM24215
0121	3104 144 04980	"MOTOR PULLEY, TRAY"
0125	3104 144 10121	TRAY MOTOR BELT
0147	3104 144 04272	TRAY
0150	3139 247 60451	ASSEMBLY TOP PLATE D4.0

MOBO (ANALOG) BOARD**Various**

1100	2722 171 00042	VFD DISPLAY BJ928GN
1101	4822 242 82114	CERAM RESONATOR 8MHZ
1102	4822 242 70938	RES XTL 32KHZ768 12P5 DT-38 B
1120	4822 276 13732	SWITCH TACT PUSH
1122	4822 276 13732	SWITCH TACT PUSH
1202	4822 276 13732	SWITCH TACT PUSH
1203	4822 276 13732	SWITCH TACT PUSH
1205	4822 276 13732	SWITCH TACT PUSH
1209	4822 276 13732	SWITCH TACT PUSH
1210	4822 276 13732	SWITCH TACT PUSH
1300▲	4822 071 51002	FUSE RAD LT 1A 250V IEC A
1301▲	9965 000 07788	FUSE RAD T2A IEC UL250V
1302▲	4822 252 11215	SURGE PROTECT DSP-301N-A21F A
1303▲	4822 265 11253	SOC FUSE V 1P F PTF/65 B
1304▲	2422 086 10786	FUSE RAD LT 4A 250V IEC A
1305▲	2422 086 10899	FUSE 5X20 ET 1A25 250V IEC B
1306▲	4822 071 55001	FUSE RAD LT 500MA 250V IEC A
1308▲	4822 071 51002	FUSE RAD LT 1A 250V IEC A
1310▲	2422 086 10769	FUSE RAD LT 125MA 250V IEC A
1600	2422 543 01427	RES XTL 18M432 12P HC49/US A
1700	2422 542 90147	TUN IF V+U PLL IEC BGIDKL B
1900	4822 265 11154	CON V 22P F 1.00 FFC 0.3 B
1915	4822 267 11031	CON V 10P F 1.00 FFC 0.3 B
1920	2422 026 05301	SOC CINCH V 3P FJPJ1127 B
1921	2422 026 05307	CON MDIN H 4P F YKF51 B
1922	2422 025 17797	CON V 15P F 1.00 FFC 0.3 B
1931▲	4822 265 20723	CON BM V 2P M 7.92 VH B
1940	2422 033 00334	CON BM EURO H 42P F BK GRND-L
1942	2422 025 17797	CON V 15P F 1.00 FFC 0.3 B
1945	2422 026 05308	SOC CINCH H 3P F YEWHRD Y
1947	4822 265 11154	CON V 22P F 1.00 FFC 0.3 B
1948	4822 267 10994	SOC MDIN H 4P F TCS7927 B
1955	4822 267 31729	SOC CINCH H 1P F BK B

—II—

2102	4822 124 11968	SUPCAP SE 5V5 S 220MF P80M20 A
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2301	2020 554 90173	CERSAF KX 250V S 2,2NF PM20 B
2302	2020 021 91506	ELCAP ZL 16V S 1000UF PM20 B
2306	4822 122 31175	1NF 10% 500V
2308	4822 122 31175	1NF 10% 500V
2309	2020 021 91506	ELCAP ZL 16V S 1000UF PM20 B
2311▲	4822 121 10512	275V 220NF 20%
2313	4822 121 70386	47NF 10% 250V
2315▲	2022 020 00742	ELCAP LS 400V S 68UF PM20 B
2316	2020 021 91506	ELCAP ZL 16V S 1000UF PM20 B
2318▲	4822 126 14525	47PF 5% 1KV
2321	2020 021 91506	ELCAP ZL 16V S 1000UF PM20 B
2324	4822 121 41857	10NF 5% 250V
2326	4822 126 10206	2,2NF 10% 500V
2327	4822 121 51598	2,2NF 5% 400V

—WW—

3211	4822 117 12063	NTC DC 5W 10K 5%
3300▲	4822 053 21335	3M3 5% 0,5W
3301▲	4822 053 21335	3M3 5% 0,5W
3318▲	4822 053 21684	680K 5% 0,5W
3330	2322 193 14477	RST MFLM PR01 A 0,47R PM5 A
3331	2322 193 14687	RST MFLM PR01 A 0,68R PM5

—

5100	2422 549 43062	IND FXD EMI 100MHZ 600R R
5101	4822 157 50964	100MUH
5300▲	2422 531 02546	TFM SMT SLOT SRW28EC9-E01V0* B
5301	2422 535 94634	IND FXD LHL08 S 2U2 PM20 A
5302▲	2422 549 44509	FIL MAINS 25MH 0A4 HF2022R Y
5303	4822 157 11737	22UH 10% 9X9,5
5304	4822 157 11737	22UH 10% 9X9,5
5305	4822 157 70826	2,4UH
5306	4822 157 11737	22UH 10% 9X9,5
5307	4822 157 70826	2,4UH
5401	4822 157 11706	10UH 5% 2,4X3,4
5402	4822 157 11706	10UH 5% 2,4X3,4
5551	2422 536 00019	TRANSFORMER 6RG (SAGA) B
5600	4822 157 11706	10UH 5% 2,4X3,4
5601	4822 157 11706	10UH 5% 2,4X3,4
5700	4822 157 11737	22UH 10% 9X9,5
5701	2422 549 43062	IND FXD EMI 100MHZ 600R R
5702	2422 549 43062	IND FXD EMI 100MHZ 600R R
5703	2422 549 43062	IND FXD EMI 100MHZ 600R R
5704	4822 157 11706	10UH 5% 2,4X3,4
5801	4822 157 11706	10UH 5% 2,4X3,4
5802	2422 549 43062	IND FXD EMI 100MHZ 600R R
5803	2422 549 43062	IND FXD EMI 100MHZ 600R R

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6002	4822 130 11397	BAS316
6003	4822 130 11397	BAS316
6004	4822 130 11397	BAS316
6006	4822 130 11397	BAS316
6007	4822 130 11397	BAS316
6100	4822 130 80622	BAT54
6101	4822 130 80622	BAT54
6102	4822 130 11416	PDZ6.8B
6103	4822 130 11397	BAS316
6104	4822 130 11397	BAS316
6105	4822 130 11397	BAS316
6108	4822 130 11397	BAS316
6114	4822 130 11397	BAS316
6188	4822 130 80622	BAT54
6200	9340 548 61115	PDZ12B
6201	9340 548 61115	PDZ12B
6202	9340 548 61115	PDZ12B
6203	9340 548 61115	PDZ12B
6204	9340 548 61115	PDZ12B
6211	9322 190 44676	LED VS LTL-1MHHR
6300	9322 161 76682	SB340L-7024
6301	9322 161 76682	SB340L-7024

6302	4822 130 31083	BYW55
6303	4822 130 31083	BYW55
6304	9322 184 68682	STPSSL40-C2
6305	4822 130 31083	BYW55
6306	9322 184 68682	STPSSL40-C2
6307	4822 130 31083	BYW55
6308	9322 126 71673	BYT42M A
6309	9322 161 78682	SB360L-7024
6310	4822 130 31878	1N4003G
6311	4822 130 10871	SBYV27-200
6312	4822 130 11397	BAS316
6313	4822 130 11416	PDZ6.8B
6314	3198 020 55680	BZX384-C5V6
6315	4822 130 41601	BYV95A
6316	4822 130 34142	BZX79-B33
6317	4822 130 80622	BAT54
6318	4822 130 41601	BYV95A
6319	4822 130 30842	BAV21
6320	9340 548 69115	PDZ27B
6321	4822 130 34382	BZX79-B8V2
6322	4822 130 11397	BAS316
6401	4822 130 11416	PDZ6.8B
6402	4822 130 11416	PDZ6.8B
6403	4822 130 11416	PDZ6.8B
6404	4822 130 11416	PDZ6.8B
6405	9340 548 61115	PDZ12B
6406	9340 548 61115	PDZ12B
6407	9340 548 61115	PDZ12B
6408	9340 548 61115	PDZ12B
6409	4822 130 11416	PDZ6.8B
6410	9340 548 61115	PDZ12B
6411	9340 548 61115	PDZ12B
6412	9340 548 61115	PDZ12B
6413	9340 548 61115	PDZ12B
6414	9340 548 61115	PDZ12B
6415	9340 548 61115	PDZ12B
6416	4822 130 11416	PDZ6.8B
6417	4822 130 11416	PDZ6.8B
6418	9340 548 61115	PDZ12B
6419	9340 548 61115	PDZ12B
6420	9340 548 61115	PDZ12B
6421	9340 548 61115	PDZ12B
6422	9340 548 61115	PDZ12B
6423	9340 548 61115	PDZ12B
6424	4822 130 11397	BAS316
6600	4822 130 11397	BAS316
6803	9340 548 61115	PDZ12B
6804	9340 548 61115	PDZ12B
6805	4822 130 11522	UDZ15B
6806	9340 548 61115	PDZ12B
6807	4822 130 11522	UDZ15B



7000	3198 010 42320	BC857BW
7001	4822 130 60854	DTA124EU-W
7002	4822 130 60854	DTA124EU-W
7004	9322 148 78668	AD1852JRS
7005	4822 209 62312	MC33078D
7006	4822 130 60854	DTA124EU-W
7008	9352 670 99118	UDA1361TS/N1
7009	4822 130 61553	DTC124EU
7045	3198 010 42310	BC847BW
7100	9322 196 98685	NCP301LSN47
7101	4822 130 61553	DTC124EU
7102	4822 130 40981	BC337-25
7103	3198 010 42310	BC847BW
7104	4822 130 41246	BC327-25
7105	3198 010 42310	BC847BW
7106	4822 130 41246	BC327-25
7107	3139 240 50861	TMP87CM74AFG-5JP4 w/ mark "ASP017-50861" (Lead-free)
7107	3139 240 50921	TMP87CM74AF-5JP4 w/ mark "ASP017-50921" (non Lead-free)
7108	3198 010 42310	BC847BW
7110	3198 010 42310	BC847BW
7111	4822 130 61553	DTC124EU
7112	3198 010 42310	BC847BW
7113	3198 010 42320	BC857BW
7114	9965 000 04199	BSN20
7115	9965 000 04199	BSN20
7116	3198 010 42320	BC857BW
7118	3198 010 42310	BC847BW
7123	3198 010 42310	BC847BW
7124	3198 010 42310	BC847BW
7200	9322 185 95667	IR RECEIVER TSOP4836
7300	9322 183 38668	STS9NF30L
7301	4822 209 14933	TL431IZ
7302	4822 130 11336	STP16NE06FP
7303	4822 209 14933	TL431IZ
7304	9322 183 38668	STS9NF30L

7305	4822 209 14933	TL431IZ
7306	9322 163 75685	SI2306DS
7307	4822 130 11417	STP3NB60FP
7308	4822 130 61553	DTC124EU
7309	9322 180 12685	SI2312DS
7310	4822 130 41782	BF422
7311	9352 673 56112	TEA1507P/N1
7312	3198 010 42320	BC857BW
7313	3198 010 42310	BC847BW
7314	3198 010 42310	BC847BW
7316	9965 000 09548	PHOTOCOUPLER TCET1108G
7318	4822 130 40959	BC547B
7319	4822 209 14933	TL431IZ
7321	9322 163 75685	SI2306DS
7322	9322 163 75685	SI2306DS
7323	3198 010 42310	BC847BW
7324	4822 130 61553	DTC124EU
7325	9322 163 75685	SI2306DS
7401	3198 010 42310	BC847BW
7402	3198 010 42320	BC857BW
7404	3198 010 42320	BC857BW
7405	3198 010 42310	BC847BW
7407	3198 010 42310	BC847BW
7408	9340 219 30115	BC817-25W
7409	3198 010 42310	BC847BW
7410	9322 173 41668	ST6618
7411	9322 024 55662	NJM2234M
7412	3198 010 42320	BC857BW
7413	3198 010 42310	BC847BW
7414	3198 010 42310	BC847BW
7415	9340 219 30115	BC817-25W
7416	9322 174 75668	NJM2235M
7500	4822 209 62312	MC33078D
7501	5322 209 11102	HEF4052BT
7503	4822 209 62312	MC33078D
7504	5322 209 11102	HEF4052BT
7505	9340 219 30115	BC817-25W
7507	9340 219 30115	BC817-25W
7551	5322 209 11517	PC74HC04T
7600	9322 186 87668	MSP3415G-QG-B8V3 (MIAS)
7601	4822 130 61553	DTC124EU
7602	9340 219 30115	BC817-25W
7603	9340 219 30115	BC817-25W
7802	9340 219 30115	BC817-25W
7803	9322 174 76668	NJM2267M
7804	9340 219 30115	BC817-25W
7951	4822 209 60177	LM339D
7953	3198 010 42310	BC847BW
7954	3198 010 42310	BC847BW

2081	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2083	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2098	4822 124 80151	47UF 16V
2107	5322 124 41945	22UF20% 35V
2416	4822 124 12095	100UF 20% 16V
2431	4822 124 23002	10UF 16V
2446	5322 124 41945	22UF20% 35V
2448	2020 552 95812	CER2 1206 X7R 16V 1U PM10 R
2515	4822 124 23002	10UF 16V
2533	4822 124 23002	10UF 16V
2538	4822 124 23002	10UF 16V
2580	5322 124 41945	22UF20% 35V
2612	5322 124 41945	22UF20% 35V
2653	5322 124 41945	22UF20% 35V
2654	5322 124 41945	22UF20% 35V
2666	4822 124 23002	10UF 16V
2667	4822 124 23002	10UF 16V
2668	4822 124 23002	10UF 16V
2669	4822 124 23002	10UF 16V
2812	4822 124 23002	10UF 16V
2818	4822 124 23002	10UF 16V
2828	4822 124 23002	10UF 16V
2838	2020 021 91857	ELCAP FK 6V3 100U PM20 R
2981	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2989	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2999	2020 021 91857	ELCAP FK 6V3 100U PM20 R

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3000	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3001	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3003	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3004	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3005	4822 117 13523	220R 5% RESN 0.63W
3006	4822 117 13523	220R 5% RESN 0.63W
3007	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R
3008	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R
3009	4822 117 13523	220R 5% RESN 0.63W
3010	4822 117 13523	220R 5% RESN 0.63W
3025	4822 117 12662	10R X4 5%
3029	4822 117 12662	10R X4 5%
3084	3198 031 11010	RST NETW 1206 4X100R PM5 COL R
3085	3198 031 11010	RST NETW 1206 4X100R PM5 COL R
3541	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3542	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3543	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3562	4822 117 13526	150R 5% RESN 0.63W
3583	4822 117 13526	150R 5% RESN 0.63W
3584	4822 117 13526	150R 5% RESN 0.63W
3585	4822 117 13526	150R 5% RESN 0.63W
3587	4822 117 13526	150R 5% RESN 0.63W
3588	4822 117 13526	150R 5% RESN 0.63W
3589	4822 117 13526	150R 5% RESN 0.63W
3615	2350 035 10829	RST NETW ARV24 4X 82R PM5 R
3631	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3635	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3639	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3643	3198 031 13390	RST NETW 1206 4X 33R PM5 COL
3800	2350 035 10229	RST NETW ARV24 4X22R PM5 R
3801	2350 035 10229	RST NETW ARV24 4X22R PM5 R
3802	2350 035 10229	RST NETW ARV24 4X22R PM5 R
3803	2350 035 10229	RST NETW ARV24 4X22R PM5 R
3804	4822 117 13573	NETW 4 X 47R 5% MNR14
3805	4822 117 13573	NETW 4 X 47R 5% MNR14
3806	4822 117 13573	NETW 4 X 47R 5% MNR14
3807	4822 117 13573	NETW 4 X 47R 5% MNR14

FEBE BOARD

Various

1000	2422 025 17955	CON V 6P M 1.00 SR R
1001	2422 543 01368	RES XTL 24M576 12P CX8045 R
1002	2422 543 01422	RES XTL 24M576 18P CX8045 R
1100	2422 025 17821	CON H 45P F 0.50 FPC 0.3 R
1302	2422 543 01025	RES XTL 16M93 20P CX- 16F R
1400	2422 025 05548	CON H 4P F 1.00 FFC 0.3
1401	2422 025 18382	CON H 11P F 1.00 FPC 0.3
1601	2122 662 00152	PTC 1812 16V 0R18 PM
1602	2122 662 00136	PTC 1812 6V 0R21 PM
1901	2422 025 16389	CON BM V 22P F 1.00 FFC 0.3 R
1902	2422 025 16389	CON BM V 22P F 1.00 FFC 0.3 R
1903	8204 056 66001	CON V 7P M 2.00 PH R
1904▲	2422 086 11087	FUSE F 1A 125V UL R
1905	8204 056 66011	CON V 12P M 2.00 PH R
1906▲	2422 086 11087	FUSE F 1A 125V UL R
1907	2422 025 16729	CON BM V 10P F 1.00 FFC 0.3 R
1908▲	2422 086 11087	FUSE F 1A 125V UL R
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2013	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2014	4822 124 12095	100UF 20% 16V
2062	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2071	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R
2073	2020 021 91729	ELCAP RKV 35V 4U7 PM20 R

3808	4822 117 13573	NETW 4 X 47R 5% MNR14	5906	2422 549 45634	IND FXD 0603 EMI 100MHZ 60R R	7917	5322 130 60159	BC846B
3809	4822 117 13573	NETW 4 X 47R 5% MNR14	5909	2422 549 45634	IND FXD 0603 EMI 100MHZ 60R R	7918	4822 130 61553	DTC124EU
3810	4822 117 13573	NETW 4 X 47R 5% MNR14	5914	2422 549 45634	IND FXD 0603 EMI 100MHZ 60R R	7920	5322 130 60159	BC846B
3811	4822 117 13573	NETW 4 X 47R 5% MNR14	5915	2422 536 00598	IND FXD 1210 1U5 PM20 R	7921	5322 130 60159	BC846B
3812	3198 031 13390	RST NETW 1206 4X 33R PM5 COL	5916	2422 549 45634	IND FXD 0603 EMI 100MHZ 60R R	7922	9352 456 80115	74HCT1G125GW
3813	3198 031 13390	RST NETW 1206 4X 33R PM5 COL	5917	2422 549 45634	IND FXD 0603 EMI 100MHZ 60R R	7923	9352 500 20118	74LVC08AD (PHSE) R
3814	3198 031 13390	RST NETW 1206 4X 33R PM5 COL	5918	4822 157 11499	BLM11P600SPT	7924	9352 317 20118	74LVC125APW (PHSE) R
3815	3198 031 13390	RST NETW 1206 4X 33R PM5 COL	5919	2422 536 00598	IND FXD 1210 1U5 PM20 R	7926	9322 191 99685	NCP303LSN29 (ONSE) R
3846	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R	5920	2422 536 00598	IND FXD 1210 1U5 PM20 R	7927	9322 188 69668	ST55DNF20V (ST00) R
3873	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R	5921	4822 157 11499	BLM11P600SPT	7928	9322 188 69668	ST55DNF20V (ST00) R
3874	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R	5922	4822 157 70649	4,7UH (NL322522T-4R7J)	7929	9322 188 68668	NCP1570D (ONSE) R
3875	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R	5923	2422 536 00598	IND FXD 1210 1U5 PM20 R	7950	9340 425 20115	BC847BS (PHSE) R
3876	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R	5924	2422 536 00598	IND FXD 1210 1U5 PM20 R			
3877	3198 031 14720	RST NETW 1206 4X4K7 PM5 COL R	5925	3198 018 90050	FXDIND 0603 100MHZ 1K COL R			
3897	3198 031 11030	RST NETW 1206 4X 10K PM5 COL R	5926	4822 157 70649	4,7UH (NL322522T-4R7J)			
3903	3198 031 11030	RST NETW 1206 4X 10K PM5 COL R	5927	4822 157 11499	BLM11P600SPT			
3904	3198 031 11030	RST NETW 1206 4X 10K PM5 COL R	5928	4822 157 11499	BLM11P600SPT			
			5929	4822 157 11717	BLM31P500SPT			
			5930	4822 157 11499	BLM11P600SPT			
			5931	2422 535 94995	IND FXD 10145 10U PM20 R			
			5932	4822 157 11717	BLM31P500SPT			
			5933	4822 157 11717	BLM31P500SPT			
			5934	4822 157 11717	BLM31P500SPT			
			5935	4822 157 11499	BLM11P600SPT			
			5936	4822 157 11717	BLM31P500SPT			
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11. Revision List

Version 1.0: Initial release

Version 1.1: Addition of Lecolite (LECO) module for DVDR610/
00/02/05 usage